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## PATENT ABSTRACTS OF JAPAN

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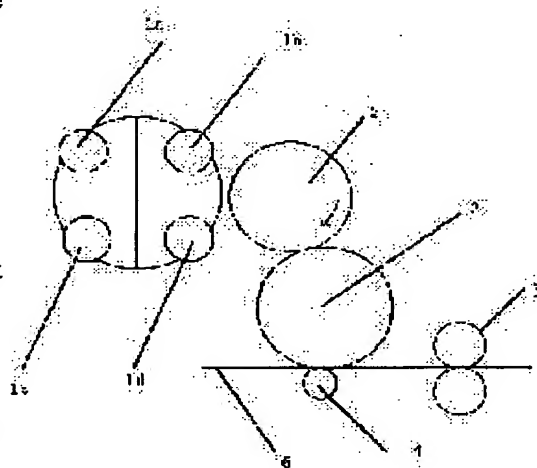
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**(54) METHOD AND DEVICE FOR IMAGE FORMATION AND TONER FOR ELECTROSTATIC CHARGE IMAGE DEVELOPMENT****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide a method and a device for full-color image formation and toner which are free of transfer dust, transfer absence, transfer unevenness, and surface fogging.

**SOLUTION:** The full-color image forming method which reproduces a full-color image by superposing three colors of yellow, cyan, and magenta one over another and uses only black for a monochromatic image when toner images on an intermediate transfer body is secondarily transferred together to a transfer member at a time and then the toner on the transfer member is fixed is characterized by (a) that when toner in early development order between cyan and magenta is denoted as A and toner in later development order is denoted as B, a fluidity imparting agent is added more to A than to B, (b) that the absolute value  $|\overline{QA/m}|$  of a toner electrostatic charging quantity is larger than the absolute value  $|\overline{QA/m}|$ , (c) that  $15 \mu$

$C/g < |\overline{QA/m}| < 40 \mu C/G$ , and (d) that secondary transfer is carried out by making a transfer device applied with a transfer bias about to  $\geq 3 g/cm$  and transferring the toner image to the transfer member.

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**CLAIMS**


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**[Claim(s)]**

[Claim 1] Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, When a toner image on this middle imprint object is put in block, the 2nd order is imprinted to an imprint member and a toner on an imprint member is subsequently established, In a full color image formation method which performs full color reappearance by yellow, cyanogen, and 3 color piles of a Magenta, and uses only black in one color (a) At least a full color toner Binding resin, a coloring matter, when it contains a fluidization grant agent further and a toner of the one where A and the order of development are later is set to B for a toner of the one where the order of development of cyanogen and a Magenta is earlier, an addition of a fluidization grant agent —  $A > B$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time — | It is the image formation method which  $QB/m|$  is  $|QA/m| > |QB/m|$ , is (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ , and is characterized by for the (d) imprint [ secondary ] making imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and imprinting a toner image to an imprint member.

[Claim 2] Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, In a full color image formation method which carries out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and is subsequently established in a toner on an imprint member (a) At least a full color toner Binding resin, a coloring matter, when it contained a fluidization grant agent further, and it sets A and the 2nd toner to B and a toner with the latest order of development is set to C for a toner with the earliest order of development of cyanogen, a Magenta, and the black, an addition of a fluidization grant agent —  $A > B > C$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time — |  $QB/m|$  and  $|QC/m|$  are  $|QA/m| > |QB/m| > |QC/m|$ . (c) It is the image formation method which is  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$  and is characterized by for the (d) imprint [ secondary ] making imprint equipment with which imprint bias was impressed contact by cm in 3g /or more, and imprinting a toner image to an imprint member.

[Claim 3] Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, In a full color image formation method which carries out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and is subsequently established in a toner on an imprint member (a) A full color toner contains binding resin, a coloring matter, and also a fluidization grant agent at least. When B and the 3rd toner are set to C and a toner with the latest order of development is set [ a toner with the earliest order of development of yellow,

cyanogen, a Magenta, and the black ] to D for A and the 2nd toner, an addition of a fluidization grant agent —  $A > B > C > D$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$ ,  $|QC/m|$ , and  $|QD/m|$  are

$|QA/m| > |QB/m| > |QC/m| > |QD/m|$ . (c) It is the image formation method which is  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$  and is characterized by for the (d) imprint [ secondary ] making imprint equipment with which imprint bias was impressed contact by cm in 3g /or more, and imprinting a toner image to an imprint member.

[Claim 4] An image formation method according to claim 1 to 3 characterized by said middle imprint object being a middle imprint belt.

[Claim 5] An image formation method according to claim 1 to 4 characterized by said electrostatic latent-image support being a photo conductor belt.

[Claim 6] An image formation method according to claim 1 to 5 characterized by said middle imprint object carrying out minute amount spreading of the zinc stearate.

[Claim 7] Image formation equipment characterized by the following Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, When a toner image on this middle imprint object is put in block, the 2nd order is imprinted to an imprint member and a toner on an imprint member is subsequently established, Full color reappearance is performed by yellow, cyanogen, and 3 color piles of a Magenta, it sets to full color image formation equipment of a method which uses only black in one color, and (a) full color toner is binding resin, a coloring matter, and also a fluidization grant agent at least. When a toner of the one where A and the order of development are later is set to B for a toner of the one where the order of development of cyanogen and a Magenta is earlier, an addition of a fluidization grant agent —  $A > B$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$  is  $|QA/m| > |QB/m|$  and is (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ , and the (d) imprint [ secondary ] makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and imprints a toner image to an imprint member.

[Claim 8] Image formation equipment characterized by the following Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, full color image formation equipment of a method which carries out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and is subsequently established in a toner on an imprint member — setting — (a) full color toner — at least — binding resin and a coloring matter — further — a fluidization grant agent When A and the 2nd toner are set to B and a toner with the latest order of development is set to C for a toner with the earliest order of development of cyanogen, a Magenta, and the black, an addition of a fluidization grant agent —  $A > B > C$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$  and  $|QC/m|$  are  $|QA/m| > |QB/m| > |QC/m|$ . (c) It is the method which is  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ , and the (d) imprint [ secondary ] makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and imprints a toner image to an imprint member.

[Claim 9] Image formation equipment characterized by the following Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, full color image formation equipment of a method which carries out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and is subsequently established in a toner on an imprint member — setting — (a) full color toner — at least — binding resin and a coloring matter — further — a fluidization grant agent When B and the 3rd toner are set to C and a toner with the latest order

of development is set [ a toner with the earliest order of development of yellow, cyanogen, a Magenta, and the black ] to D for A and the 2nd toner, an addition of a fluidization grant agent —  $A > B > C > D$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$ ,  $|QC/m|$ , and  $|QD/m|$  are  $|QA/m| > |QB/m| > |QC/m| > |QD/m|$ . (c) It is the method which is  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ , and the (d) imprint [ secondary ] makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and imprints a toner image to an imprint member.

[Claim 10] Image formation equipment according to claim 7 to 9 characterized by said middle imprint object being a middle imprint belt.

[Claim 11] Image formation equipment according to claim 7 to 10 characterized by said electrostatic latent-image support being a photo conductor belt.

[Claim 12] Image formation equipment according to claim 7 to 11 characterized by said middle imprint object carrying out minute amount spreading of the zinc stearate.

[Claim 13] A toner for electrostatic-charge image development characterized by the following Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, When a toner image on this middle imprint object is put in block, the 2nd order is imprinted to an imprint member and a toner on an imprint member is subsequently established, Full color reappearance is performed by yellow, cyanogen, and 3 color piles of a Magenta. Use only black in one color and a secondary imprint makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm. It is the toner which uses a toner image in full color image formation of a method imprinted to an imprint member, and (a) full color toner is binding resin, a coloring matter, and also a fluidization grant agent at least. a time of setting to B a toner of the one where A and the order of development are later for a toner of the one where the order of development of cyanogen and a Magenta is earlier — an addition of a fluidization grant agent —  $A > B$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time, and  $|QB/m|$  —  $|QA/m| > |QB/m|$  — it is — (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$

[Claim 14] A toner for electrostatic-charge image development characterized by the following Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, Carry out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and, subsequently a toner on an imprint member is established. And a secondary imprint is a toner used in full color image formation of a method which imprint equipment with which imprint bias was impressed is made to contact by 3 or more g/cm, and imprints a toner image to an imprint member, and (a) full color toner is binding resin, a coloring matter, and also a fluidization grant agent at least. When A and the 2nd toner are set to B and a toner with the latest order of development is set to C for a toner with the earliest order of development of cyanogen, a Magenta, and the black, an addition of a fluidization grant agent —  $A > B > C$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time,  $|QB/m|$ , and  $|QC/m|$  —  $|QA/m| > |QB/m| > |QC/m|$  — it is — (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$

[Claim 15] A toner for electrostatic-charge image development characterized by the following Have yellow, cyanogen, a Magenta, and the development section of four black colors, and an electrostatic latent image is formed on electrostatic latent-image support about each. After developing this with a color toner and carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, Carry out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and, subsequently a toner on an imprint member is established. And a secondary imprint is a toner used in full color image formation of a method which imprint equipment with which imprint bias was impressed is made to contact by 3 or more g/cm, and imprints a toner image to an imprint member, and (a) full color toner is binding resin, a coloring matter, and also a fluidization grant

agent at least. When B and the 3rd toner are set to C and a toner with the latest order of development is set [ a toner with the earliest order of development of yellow, cyanogen, a Magenta, and the black ] to D for A and the 2nd toner, an addition of a fluidization grant agent —  $A > B > C > D$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$ ,  $|QC/m|$ , and  $|QD/m|$  are  $|QA/m| > |QB/m| > |QC/m| > |QD/m|$  and it is (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ .

[Claim 16] A toner for electrostatic-charge image development according to claim 13 to 15 characterized by said fluid grant agent being a silicone oil or the silica by which silicone varnish processing was carried out.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]**

**[0001]**

**[The technical field to which invention belongs]** This invention relates to the full color toner used for the full color image formation method and image formation equipment list which used electrophotography methods, such as a printer and a copying machine, at them. In detail The primary imprint which middle imprint objects, such as a middle imprint belt, are made to intervene, and imprints a toner image from electrostatic \*\*\*\*\* latent-image support to a middle imprint object, It is related with the toner for electrostatic-charge image development used for the image formation method and image formation equipment list which perform image formation through each imprint production process of the secondary imprint which imprints the primary transfer picture on a middle imprint object to imprint material at them.

**[0002]**

**[Description of the Prior Art]** Conventionally, in color picture formation equipments which form a color picture using an electrophotography recording method, such as a color printer and a copying machine, an electrostatic latent image is formed on electrostatic latent-image support about each, this is developed with the color toner of each color, and the full color toner image is formed by carrying out electrostatic image transfer of the toner image on this electrostatic latent-image support to an imprint object. And after, carrying out the heavy imprint (primary imprint) of the toner image of one amorous glance formed in electrostatic latent-image support, two amorous glance, three amorous glance, and four amorous glance to a middle imprint object one by one for example, and forming the toner image of a color in a middle transfer medium, the middle imprint method which imprints the toner image of this color collectively to a record base material (secondary imprint) is proposed. In the case of this middle imprint method, it is adopted comparatively mostly from that the correspondence and control for making it not generate a color gap are easy, compaction of the conveyance portion of an imprint member, simplification of a conveyance path, etc. being easy.

**[0003]** However, thrust will be given to the electrostatic latent image top on electrostatic latent image support in the case of the development of other colors, since an imprint production process increase further, it will become that a portion with the strong adhesion force arise and be hard to imprint between the toner of an electrostatic latent image, and the present electrostatic latent image support, and in the color picture formation equipment which used the middle imprint object, the problem ( the so-called imprint omission) which a deficit produce in an image will arise. Moreover, a solid image serves as nonuniformity and turns into a very unsightly image [ BOSOBOSO / especially / image / the full color image ] because the nonuniformity of imprint effectiveness arises even if it does not become an imprint omission (henceforth imprint BOSOTSUKI). Furthermore a full color printer spreads in recent years, and since many surface record media with big irregularity, indeterminate form forms, etc., such as recycled paper and bond paper, are used in that it is still more important and a printer, the problem of having to make it imprint, without producing an image defect has image repeatability.

**[0004]** In order to solve these problems conventionally, abundant addition of the external additives, such as a silica which is a fluid grant agent, was carried out, and means to make



lowering, an imprint omission, and imprint BOSOTSUKI prevent have been taken in the cohesive force of a toner. However, although a fluidity of until will improve to some extent with an addition if the quantity of external additives, such as a silica, is increased, there is a limit. Moreover, when using the middle transfer medium of the belt which the suspended matter of a silica increased, for example, used urethane as the base material, the silica isolated from this toner parent is driven into a belt, a blemish occurs or silica filming which a silica fixes to a belt occurs. Moreover, a silica serves as a nucleus, it is devoted to electrostatic latent-image support by the thrust of a cleaning blade, and a blemish occurs. And filming which a silica and a toner fix on electrostatic latent-image support occurs. Moreover, the suspended matter of a silica adheres to the solid image section, and a flake occurs. Furthermore, in the color picture formation method of performing a heavy imprint, the so-called imprint Chile where a toner scatters by increase in quantity of an additive occurs, and there is a problem of causing the fall of resolution and deterioration of image quality.

[0005] As a method of solving these problems, it is indicated by by conglobating the configuration of the toner used for the image formation equipment of a middle imprint method by JP,7-181732,A or JP,7-181733,A that the imprint omission at the time of an imprint, imprint BOSOTSUKI, and spilling are improved. However, although there was some amelioration effect about an imprint omission, the effect is still inadequate and it was almost ineffective about imprint Chile. It has the problem that the frictional electrification between blades becomes inadequate and electrification of a toner becomes unstable, by conglobating a configuration in 1 component development especially.

[0006] Moreover, in a middle imprint method, as for these imprint omissions and imprint BOSOTSUKI, a color with the earlier order of development is easy to happen. Namely, for example, one amorous glance, two amorous glance which were formed in electrostatic latent-image support, The toner image of three amorous glance and four amorous glance is imprinted on a middle imprint object. The 1st layer, a two-layer eye, when the toner layer (the 3rd layer and 4th layer) is formed in piles, as for the toner of one amorous glance on a middle imprint object, 2 amorous glance or subsequent ones laps — it does not start not lapping, but when its imprint is included, if it is two amorous glance, it will pass along primary imprint production processes 3 times 4 times. For this reason, when \*\*\*\*\* starts at primary imprint production processes in addition to the time of imaging, it is thought that it is because the earlier thing of the order of development becomes that the cohesive force within an imprint toner layer becomes strong, and is hard to imprint from the toner layer nearest to a middle imprint object.

[0007] On the other hand, about imprint Chile, since it becomes easy to move a toner also by few rebounding force between toners easily when [ fluid ] the cohesive force between toners is high comparatively small, since the rebounding force by the like-pole nature of a toner acts between the toner already imprinted and the toner imprinted next, in a heavy imprint, a toner tends to scatter by the imprint of an after production process. in order to solve this problem — the patent No. 2680081 official report — if — although it is indicated that imprint Chile and imprint omission prevention are solved by setting the sequence of the heavy imprint by the toner as order with many contents of a fluid improvement additive, it has not come to solve imprint Chile in the development method by which is inadequate about imprint Chile by electrostatic repulsion, and the contact pressure of an imprint roller etc. is applied especially. Moreover, in order to reduce imprint Chile, making the amount of electrifications low is also considered, but when the amount of electrifications of a toner is low and the toners of reversed polarity increase in number, it becomes toner adhesion in the natural complexion section, and there is fault which serves as a fogging of the natural complexion section and appears by the output image on a transfer paper. By the full color development method made to develop especially four colors, since fogging of the natural complexion section becomes 4 times, it is easy to be conspicuous. Moreover, when the standup of toner electrification worsens, there is fault to which concentration stability — produce a concentration difference to image concentration, or a ghost appears at a paper order edge in it — worsens.

[0008] Although the means of setting up so that the amount of a color pile may be reduced by reproducing FURUKARA with yellow, cyanogen, and a Magenta, reproducing black only black, and

reducing the count of a heavy imprint by the image processing technique about imprint Chile from these things or performing inking are taken, it is not yet enough. Moreover, since it is rare for black to perform a color pile, in case it is easy to be conspicuous in order of black, a Magenta, cyanogen, and yellow from the amorous glance when a development color creates FURUKARA by four colors of yellow, a Magenta, cyanogen, and black, but either a Magenta or cyanogen and both are piled up, imprint Chile very becomes easy to be conspicuous, but in case yellow is piled up later, imprint Chile cannot be conspicuous easily and cannot influence image repeatability comparatively easily greatly.

[0009]

[Problem(s) to be Solved by the Invention] The purpose of this invention solves the above-mentioned troubles, such as imprint Chile by the imprint omission and toner which are generated at the time of a contact imprint, in the full color image formation method which used the middle imprint method, and it is in offering the image formation method by which the high definition to which there is not and the color-balance was able to take color nonuniformity and a natural complexion fogging is obtained. Moreover, the purpose of this invention solves the above-mentioned troubles, such as imprint Chile by the imprint omission and toner which are generated at the time of a contact imprint, in the image formation equipment of the full color image formation method which used the middle imprint method, and it is in offering the image formation equipment with which the high definition to which there is not and the color-balance was able to take color nonuniformity and a natural complexion fogging is obtained. Furthermore, the purpose of this invention is in the toner used for the image formation which used the middle imprint method to offer the toner for electrostatic-charge image development which can solve the above-mentioned troubles, such as imprint Chile by the imprint omission and toner which are generated at the time of a contact imprint.

[0010]

[Means for Solving the Problem] As a result of this invention person's etc. repeating research wholeheartedly, in order to output a stable image quality characteristic without imprint BOSOTSUKI, an imprint omission, or imprint Chile, by adjusting an addition and the amount of toner electrifications of a fluid grant agent of each color toner in a middle imprint and a contact imprint, and optimizing in order of development further; it finds out that the above-mentioned purpose can be attained and came to complete this invention. Namely, according to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. After carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, When a toner image on this middle imprint object is put in block, the 2nd order is imprinted to an imprint member and a toner on an imprint member is subsequently established, In a full color image formation method which performs full color reappearance by yellow, cyanogen, and 3 color piles of a Magenta, and uses only black in one color (a) At least a full color toner Binding resin, a coloring matter, when it contains a fluidization grant agent further and a toner of the one where A and the order of development are later is set to B for a toner of the one where the order of development of cyanogen and a Magenta is earlier, an addition of a fluidization grant agent —  $A > B$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$  is  $|QA/m| > |QB/m|$  and is (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ . (d) A secondary imprint makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and an image formation method characterized by imprinting a toner image to an imprint member is offered.

[0011] Moreover, according to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. In a full color image formation method which carries out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and is subsequently established in a toner on an imprint member after carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object (a) At least a full color toner Binding resin, a

coloring matter, when it contained a fluidization grant agent further, and it sets A and the 2nd toner to B and a toner with the latest order of development is set to C for a toner with the earliest order of development of cyanogen, a Magenta, and the black, an addition of a fluidization grant agent —  $A > B > C$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$  and  $|QC/m|$  are  $|QA/m| > |QB/m| > |QC/m|$ . (c) It is  $15\text{microC} / \text{g} < |QA/m| < 40\text{microC/g}$ , and the (d) imprint [ secondary ] makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and an image formation method characterized by imprinting a toner image to an imprint member is offered.

[0012] Moreover, according to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. In a full color image formation method which carries out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and is subsequently established in a toner on an imprint member after carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object (a) A full color toner contains binding resin, a coloring matter, and also a fluidization grant agent at least. When B and the 3rd toner are set to C and a toner with the latest order of development is set [ a toner with the earliest order of development of yellow, cyanogen, a Magenta, and the black ] to D for A and the 2nd toner, an addition of a fluidization grant agent —  $A > B > C > D$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$ ,  $|QC/m|$ , and  $|QD/m|$  are  $|QA/m| > |QB/m| > |QC/m| > |QD/m|$ . (c) It is  $15\text{microC} / \text{g} < |QA/m| < 40\text{microC/g}$ , and the (d) imprint [ secondary ] makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and an image formation method characterized by imprinting a toner image to an imprint member is offered.

[0013] Moreover, according to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. After carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, When a toner image on this middle imprint object is put in block, the 2nd order is imprinted to an imprint member and a toner on an imprint member is subsequently established, In full color image formation equipment of a method which performs full color reappearance by yellow, cyanogen, and 3 color piles of a Magenta, and uses only black in one color (a) At least a full color toner Binding resin, a coloring matter, when it contains a fluidization grant agent further and a toner of the one where A and the order of development are later is set to B for a toner of the one where the order of development of cyanogen and a Magenta is earlier, an addition of a fluidization grant agent —  $A > B$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$  is  $|QA/m| > |QB/m|$  and is (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ . (d) A secondary imprint makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and image formation equipment characterized by being the method which imprints a toner image to an imprint member is offered.

[0014] Moreover, according to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. In full color image formation equipment of a method which carries out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and is subsequently established in a toner on an imprint member after carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object (a) At least a full color toner Binding resin, a coloring matter, when it contained a fluidization grant agent further, and it sets A and the 2nd toner to B and a toner with the latest order of development is set to C for a toner with the earliest order of development of cyanogen, a Magenta, and the black, an addition of a fluidization grant agent —  $A > B > C$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$  and  $|QC/m|$  are  $|QA/m| > |QB/m| > |QC/m|$ . (c) It is  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ , and the (d) imprint

[ secondary ] makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and image formation equipment characterized by being the method which imprints a toner image to an imprint member is offered.

[0015] Moreover, according to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. In full color image formation equipment of a method which carries out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and is subsequently established in a toner on an imprint member after carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object (a) A full color toner contains binding resin, a coloring matter, and also a fluidization grant agent at least. When B and the 3rd toner are set to C and a toner with the latest order of development is set [ a toner with the earliest order of development of yellow, cyanogen, a Magenta, and the black ] to D for A and the 2nd toner, an addition of a fluidization grant agent —  $A > B > C > D$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time —  $|QB/m|$ ,  $|QC/m|$ , and  $|QD/m|$  are  $|QA/m| > |QB/m| > |QC/m| > |QD/m|$ . (c) It is  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$ , and the (d) imprint [ secondary ] makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm, and image formation equipment characterized by being the method which imprints a toner image to an imprint member is offered.

[0016] Moreover, according to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. After carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, When a toner image on this middle imprint object is put in block, the 2nd order is imprinted to an imprint member and a toner on an imprint member is subsequently established, Full color reappearance is performed by yellow, cyanogen, and 3 color piles of a Magenta. Use only black in one color and a secondary imprint makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm. It is the toner which uses a toner image in full color image formation of a method imprinted to an imprint member. (a) At least a full color toner Binding resin, a coloring matter, when it contains a fluidization grant agent further and a toner of the one where A and the order of development are later is set to B for a toner of the one where the order of development of cyanogen and a Magenta is earlier, an addition of a fluidization grant agent —  $A > B$  — it is — (b) — a toner for electrostatic-charge image development characterized by for absolute value  $|QA/m|$  of the amount of toner electrifications at this time and  $|QB/m|$  being  $|QA/m| > |QB/m|$ , and being (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$  is offered.

[0017] Furthermore, according to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. After carrying out a primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, Carry out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and, subsequently a toner on an imprint member is established. And a secondary imprint makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm. It is the toner which uses a toner image in full color image formation of a method imprinted to an imprint member. (a) At least a full color toner Binding resin, a coloring matter, when it contained a fluidization grant agent further, and it sets A and the 2nd toner to B and a toner with the latest order of development is set to C for a toner with the earliest order of development of cyanogen, a Magenta, and the black, an addition of a fluidization grant agent —  $A > B > C$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time — A toner for electrostatic-charge image development characterized by for  $|QB/m|$  and  $|QC/m|$  being  $|QA/m| > |QB/m| > |QC/m|$  and being (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$  is offered.

[0018] According to this invention, it has yellow, cyanogen, a Magenta, and the development section of four black colors further again. Form an electrostatic latent image on electrostatic latent-image support about each, and this is developed with a color toner. After carrying out a

primary imprint for a toner image on this electrostatic latent-image support to a middle imprint object, Carry out the secondary imprint (package imprint) of the toner image on this middle imprint object to an imprint member, and, subsequently a toner on an imprint member is established. And a secondary imprint makes imprint equipment with which imprint bias was impressed contact by 3 or more g/cm. It is the toner which uses a toner image in full color image formation of a method imprinted to an imprint member. (a) A full color toner contains binding resin, a coloring matter, and also a fluidization grant agent at least. When B and the 3rd toner are set to C and a toner with the latest order of development is set [ a toner with the earliest order of development of yellow, cyanogen, a Magenta, and the black ] to D for A and the 2nd toner, an addition of a fluidization grant agent —  $A > B > C > D$  — it is — (b) — absolute value  $|QA/m|$  of the amount of toner electrifications at this time — | A toner for electrostatic-charge image development characterized by for  $QB/m|$ ,  $|QC/m|$ , and  $|QD/m|$  being  $|QA/m| > |QB/m| > |QC/m| > |QD/m|$  and being (c)  $15\text{microC/g} < |QA/m| < 40\text{microC/g}$  is offered.

[0019] It is not easy for a toner image of four colors not to be easily imprinted by homogeneity in generation of a full color image, to be easy to produce a problem in respect of color nonuniformity or a color-balance, in using a middle imprint object further, and for it to be stabilized and to output a high-definition full color image. For this reason, if a earlier thing of the order of development makes [ many ] an amount of a plasticizer when reproducing a full-color image by adopting a configuration of said this invention, i.e., a color pile About an imprint, it is hard coming to make condensation by stress of \*\*\*\*\* or others also in a primary imprint. In a secondary imprint which \*\*\*\*\* and imprint bias furthermore join in the case of a layer pile to a middle imprint object since it has been hard coming to condense a layer (in that is, the case of a secondary imprint furthest layer from an imprint member) nearest to a middle imprint object It excels in a mold-release characteristic with a middle imprint object, and an imprint omission and imprint BOSOTSUKI stop being able to happen easily.

[0020] Furthermore, by adjusting an absolute value of the amount of electrifications of earliest toner of the order of development at the time of a earlier thing of the order of development making it high also about electrification, and becoming a heavy image to the range of 15–40microC/g Electrostatic repulsion between toners is reduced, and since electrification is [ what is developed later ] low in the case of a primary [ further ] imprint and it is hard coming to generate electrostatic repulsion rather than the time when electrification is high or electrification does not change, reduction of imprint Chile can be attained. Under the present circumstances, if an absolute value of the amount of electrifications of an early toner of the order of development at the time of becoming a heavy image exceeds 40microC/g, even if it is able to decrease by the order of reduction development of dielectric repulsion, an effect becomes low and cannot prevent imprint Chile enough. Since sufficient electrification grant has not been performed with on the other hand it being under 15microC/g, it will become a natural complexion portion with fogging. Furthermore, since a total amount of a fluid grant agent can be reduced, it becomes effective also in prevention of flake generating by silicas, such as silica filming.

[0021] However, it is better to have reached a fluid grant agent and to double the amount of electrifications as mentioned above by the order of development, preferably, although it is hardly conspicuous about yellow in an actual image in this case even if imprint Chile etc. has actually occurred since it is light color. However, it never needs to be caught by this. For this reason, when reproducing FURUKARA by yellow except black, cyanogen, and 3 color piles of a Magenta, it sets. [ when relation between a Magenta and cyanogen reproduces FURUKARA by 4 color piles ] Each toner of a Magenta, cyanogen, and black preferably Yellow, a Magenta, like [ what has early cyanogen and the early order of development of each black toner ] — a fluid grant agent — many — the order of development of the parentheses — most — being early — although — the amount of electrifications — it is necessary to make an absolute value into 15–40microC/g, and, in a thing which has the still earlier order of development, an absolute value of the amount of electrifications needs to become high.

[0022]

[Embodiment of the Invention] The mimetic diagram of the example of the image formation equipment which adopted the full color image formation method applicable by this invention is

shown in drawing 1 and drawing 2. An electrostatic latent image is formed in a photo conductor (electrostatic latent-image support) (2) from the write-in optical unit which performs the optical writing corresponding to a manuscript image for image data in these equipments and which is not illustrated. This optical unit is well-known in itself, and consists of a laser diode, a polygon mirror, a polygon motor, an image formation lens, a reflective mirror, etc. Although a photo conductor (2) rotates a clockwise rotation like an arrow head, and not illustrated around it, the cleaning unit containing a front [ cleaning ] electric discharge machine, a cleaning roller, a cleaning blade, etc., an electric discharge lamp, an electrification machine, a development pattern detector, etc. are arranged. And each development counter (1a-1d) supplies a developer to the development sleeve rotated so that a developer may be made to counter a photo conductor, in order to develop an electrostatic latent image. Here, the example which set sequence (color toner formation sequence) of development actuation to C (cyanogen), M (Magenta), Y (yellow), and Bk (black) explains actuation below (however, sequence is not restricted to this).

[0023] Initiation of printing actuation (image formation) starts the optical writing by the laser beam of C image data, and latent-image formation from predetermined timing (C latent image is called hereafter.). Suppose that it is the same also about M, Y, and Bk. That development should be made possible from the point of this C latent image, before a latent-image point arrives at the development location of C development counter. (1a) rotation initiation of the development sleeve is carried out, and C latent image is developed with C toner (the amount of electrifications is held to min). Then, although development actuation of C latent-image field is continued, when C latent-image back end section passes through C development location, it changes into a development non-operative condition. This is made to complete at least before the following M image point reaches. Subsequently, C toner image formed on the photo conductor (2) is imprinted on the surface of a middle imprint object (3) (the toner image imprint to a middle imprint object (3) from a photo conductor (2) is hereafter called "primary imprint"). A primary imprint is performed by impressing imprint bias voltage in the condition that the photo conductor (2) and the middle imprint object (3) contacted. And sequential alignment of the toner image of C, M, Y, and Bk which carry out sequential formation on a middle imprint object (3) at a photo conductor (2) is carried out in the same field, the primary transfer picture of 4 color piles is formed, and a package imprint (secondary imprint) is performed to a transfer paper after that. A postscript is carried out about the unit configuration of this middle imprint object (3), and actuation.

[0024] Although it progresses after C production process in a photo conductor (2) side at M production process which used M toner which controlled the addition and the amount of electrifications of a fluid grant agent as said claim, M latent-image formation is performed in the laser beam writing by image data from predetermined timing. After previous C latent-image back end section passed to the development location, and before the tip of M latent image reaches, M development counter (1b) carries out rotation initiation of the development sleeve, and develops M latent image. Although the development of M latent-image field is continued after that, when the latent-image back end section passes, it changes into a development non-actuation condition like the case of previous C development counter. This is also made to complete before the following Y latent-image point reaches too. About the production process of Y and Bk, since the toner of each color is used and also each image data read, latent-image formation, and actuation of development are the same as that of above-mentioned C and the production process of M, explanation is omitted. Since the cohesive force within a toner layer becomes strong when \*\*\*\*\* starts at the time of imaging as described above in these primary imprints, especially 4 times of \*\*\*\*\* including own imaging will start, if the sequence of imaging is one amorous glance, Although it is desirable to stop a pressure, since a local pressure can be missed in the case of a primary imprint by using by using a photo conductor (2) as a photo conductor belt in this case, it is desirable to use a photo conductor belt.

[0025] a middle imprint object (3) is boiled with an imprint bias roller, a driving roller, a follower roller, etc., and is constructed, and drive control is carried out from a drive motor. Moreover, it may be constituted by cleaning unit \*\* etc. at the circumference of a middle imprint object if needed, and attachment-and-detachment actuation is carried out according to an attachment-



and-detachment device in that case. The timing of this attachment-and-detachment actuation is made to desert a middle imprint object (3) side until the primary imprint of Bk (this example four amorous glance of the last color) is completed from a print start, is subsequent predetermined timing and cleans by making a middle imprint object (3) side contact according to said attachment-and-detachment device. Also about a middle imprint object (3), since a local pressure can be missed, it is desirable to use a belt method and the combination of a photo conductor belt and a middle imprint belt is still more desirable ( drawing 2 ). Moreover, it is desirable from reducing the surface energy of a middle imprint object by carrying out minute amount spreading of the zinc stearate to a middle imprint body surface, being able to prevent an imprint omission further, since a mold-release characteristic with a toner layer is made still better, and the cleaning disposition top of \*\*\*\*\* being made.

[0026] the secondary imprint to imprint members, such as a transfer paper, — an imprint bias roller (4) and (the electric-field means forming for a secondary imprint) — and although not illustrated, it consists of attachment-and-detachment devices from a middle imprint object (3) etc. Although the middle imprint object (3) is usually deserted, when carrying out the package imprint of the heavy image of four colors formed in the middle imprint object (3) side at an imprint member (6), this bias roller (4) takes timing, according to an attachment-and-detachment device, it is pressed by 3 or more g/cm, impresses predetermined bias voltage to said roller (4), and performs the imprint to imprint members (6), such as a transfer paper. Under the present circumstances, thrust (linear pressure) is performed by 3 or more g/cm. It will lifting-come to be easy a location gap of the imprint material at the time of a secondary imprint, and a gap of imprint material as this thrust is less than 3 g/cm, and normal printing to imprint material will become impossible. Furthermore, paper conveyance is carried out, and the imprint member (6) by which the package imprint of the 4 color pile images was carried out in this way from the middle imprint object (3) side is conveyed by the fixing assembly (5), and can obtain the full color print by which welding fixing was carried out in the toner image with the fixing roller controlled by predetermined temperature, or a fixing belt and a pressurization roller.

[0027] Next, the toner for electrostatic-charge image development of this invention is explained concretely. The toner for electrostatic-charge image development of this invention is a toner of four colors of yellow, cyanogen, a Magenta, and black. And these toners contain binding resin, the coloring agent of each color, and also a fluidization grant agent at least. The well-known thing of the binding resin used by this invention is usable, and, specifically, as for what has been used as binding resin for toners from the former, all are applied. As such resin, for example Polyol resin, styrene / acrylic copolymer, Styrene, such as polystyrene, poly chloro styrene, and polyvinyl toluene, and the single polymer of the substitution product; Styrene / p-chloro styrene copolymer, Styrene/propylene copolymer, styrene / vinyltoluene copolymer, Styrene / vinyl naphthalene copolymer, styrene / methyl-acrylate copolymer, Styrene / ethyl-acrylate copolymer, styrene / butyl acrylate copolymer, Styrene / acrylic-acid octyl copolymer, styrene / methyl-methacrylate copolymer, Styrene / ethyl methacrylate copolymer, styrene / methacrylic-acid butyl copolymer, Styrene / alpha-Krol methyl-methacrylate copolymer, styrene/acrylonitrile copolymer, Styrene / vinyl ethyl ether copolymer, styrene / vinyl methyl ketone copolymer, Styrene / butadiene copolymer, styrene / isoprene copolymer, styrene / acrylonitrile / indene copolymer, Styrene system copolymers, such as styrene / maleic-acid copolymer, and styrene / maleate copolymer; Polymethylmethacrylate, Poly butyl methacrylate, a polyvinyl chloride, polyvinyl acetate, polyethylene, Polypropylene, polyester, a polyvinyl butyral, polyacrylic resin, These are independent, or rosin, denaturation rosin, terpene resin, phenol resin, aliphatic series or alicycle group hydrocarbon resin, aromatic series system petroleum resin, chlorinated paraffin, paraffin wax, etc. are mentioned, and they are used by two or more sorts, mixing.

[0028] All of a color well-known as a coloring matter and a pigment can use it. As an example for yellow toners, Naphthol Yellow S, Hansa yellow (10G, 5G, G), cadmium YUUMU yellow, Synthetic Ochre, ocher, the chrome yellow, Titanium Yellow, oil yellow, Hansa yellow (GR, A, RN, R), the pigment yellow L, benzidine yellow (G, GR), permanent yellow (NCG), the Balkan Peninsula fast yellow (5G, R), the Tartrazine lake, a quinoline yellow lake, the ANSURA gene yellow BGL,

isoindolinone yellow, etc. are mentioned.

[0029] As an example for Magenta toners, RISORU fast Scarlett G Brilliant Fast Scarlet, brilliant carmine BS, and Permanent Red (E2R —) F4R, FRL, FRLL, F4RH, fast Scarlett VD, Bell can fast RUBIN B, brilliant scarlet G, Litholrubin GX, Permanent Red F5R, brilliant carmine 6B, pigment scarlet 3B, Bordeaux 5B, toluidine marine, permanent Bordeaux F2K, Helio bordeaux BL, Bordeaux 10B, Bon Merlene Wright, the Bon Merlene medium, An eosine lake, the rhodamine lake B, the rhodamine lake Y, an alizarin lake, The thioindigo let B, thioindigo MARUN, oil red, the Quinacridone red, pyrazolone red, chromium Vermillion, a benzidine orange, a peri non orange, an oil orange, etc. are mentioned.

[0030] As an example for cyanogen toners, cobalt blue, cerulean blue, An alkali blue lake, a peacock blue lake, a Victoria blue lake, Non-metal copper phthalocyanine blue, copper phthalocyanine blue, fast sky blue, Indanthrene blue (RS, BC), indigo, ultramarine blue, Berlin blue, anthraquinone blue, The fast violet B, Violet Lake, cobalt purple, Manganese purple, dioxazine violet, anthraquinone violet, Chrome green, zinc green, chrome oxide, pilus JIAN emerald green, The pigment green B, the naphthol green B, green gold, an acid green lake, the Malachite Green lake, Phthalocyanine Green, anthraquinone green, titanium oxide, a zinc white, RITOBON, those mixture, etc. are mentioned.

[0031] As an example for black toners, the pigment of a cyanogen system etc. is mentioned as carbon black, the Nigrosine color, iron black, and also the complementary color. Generally the amount used is [ as opposed to / in each color / the binder resin 100 weight section ] 0.1 – 50 weight section.

[0032] The yellow, the cyanogen, Magenta, and black toner of this invention contain a fluid grant agent. As a fluid grant agent, a non-subtlety particle can be used preferably. As for the primary particle diameter of this non-subtlety particle, it is desirable that it is 5mmicro–2micrometer, and it is especially desirable that it is 5mmicro–500mmicro. Moreover, as for the specific surface area by the BET adsorption method, it is desirable that it is 20–500m<sup>2</sup>/g. As an example of a non-subtlety particle, a silica, an alumina, titanium oxide, barium titanate, titanate–acid magnesium, titanate–acid calcium, strontium titanate, a zinc oxide, the tin oxide, silica sand, clay, a mica, cay welded pyroclastic rock, the diatom earth, chrome oxide, cerium oxide, red ocher, an antimony trioxide, a magnesium oxide, zirconium oxide, sulfuric–acid PARIUMU, a barium carbonate, a calcium carbonate, silicon carbide, silicon nitride, etc. can be mentioned, for example.

[0033] In addition, the polymer particle by polycondensation systems, such as the polystyrene, methacrylic ester and the acrylic ester copolymer which are obtained by the macromolecule system particle, for example, a soap free emulsion polymerization and a suspension polymerization, and the distributed polymerization, silicone, benzoguanamine, and nylon, and thermosetting resin is mentioned.

[0034] Moreover, the method of processing by the specific silane coupling agent, the titanate coupling agent, silicone oil, an organic acid, etc. for the purpose which reforms the hydrophobicity of this inorganic powder surface, an electrification property, etc. if needed, the method of covering specific resin, etc. are proposed. Organosilicon compounds, such as silicone oil, are made to react especially, and the silica particle which replaced and carried out hydrophobing of the silanol group of the silica particle surface by the organic radical stops imprint Chile, and is more preferably used from improving imprint nature. Although these fluid grant agents may use a different thing in the toner of each color, two or more grant agents may be used and 0.01 – 5 % of the weight of an addition is desirable, 0.4 % of the weight or more is more desirable. Moreover, it is necessary to make it an addition and the amount of electrifications as specified to said claim in connection with the order of development.

[0035] The toner of this invention may contain an electrification control agent if needed. All things well-known as an electrification control agent can use it, for example, they are the simple substance of the simple substance of the Nigrosine system color, a triphenylmethane color system color, a chromium content metal complex color, a molybdic–acid chelate pigment, a rhodamine system color, an alkoxy \*\* amine, quarternary ammonium salt (fluorine denaturation quarternary ammonium salt is included), alkylamide, and phosphorus or a compound, and a tungsten or a compound, a fluorine system activator, a salicylic–acid metal salt, the metal salt of



salicylic acid derivatives, etc.

[0036] Although the amount of the electric charge control agent used is not determined by the toner manufacture method including the class of binding resin, the existence of the additive used if needed, and the distributed method and it is not uniquely limited in this invention, it is preferably used in the range of 0.1 – 10 weight section to the binding resin 100 weight section. Preferably, the range of 2 – 5 weight section is good. Negative electrification of a toner runs short and is not practical in under the 0.1 weight section. In exceeding 10 weight sections, the electrification nature of a toner is too large and, therefore, SUPENTO by increase of an electrostatic suction force with a carrier, a development sleeve, etc., filming, etc. cause the fall of image concentration. Moreover, two or more electric charge control agents may be used together if needed. Moreover, an addition may be changed by the order of development of each color toner.

[0037] In order to give a mold-release characteristic to the developer manufactured, a wax may be made to contain in the developer manufactured. Said wax has that desirable the melting point of whose is 40–120 degrees C, and what is 50–110 degrees C is especially desirable. When the melting point of a wax is excessive, fixable [ in low temperature ] may be insufficient, and when too little [ the melting point ], on the other hand, offset-proof nature and endurance may fall. In addition, it can ask for the melting point of a wax with a differential scanning calorimetry (DSC). That is, let a fixed programming rate, for example, (10 degrees C / min), the fusion peak value when \*\*\*\*(ing), be the melting point for a several mg sample.

[0038] As a wax which can be used by this invention, solid paraffin wax, micro wax, a rice wax, a fatty-acid amide system wax, a fatty-acid system wax, aliphatic series mono-ketones, a fatty-acid metal salt system wax, a fatty-acid-ester system wax, a partial saponification fatty-acid-ester system wax, a silicone varnish, higher alcohol, carnauba wax, etc. can be mentioned, for example. Moreover, polyolefines, such as low molecular weight polyethylene and polypropylene, etc. can be used. The polyolefine whose softening temperature by the ring and ball method is 70–150 degrees C is desirable especially, and the polyolefine the softening temperature of whose is 120–150 degrees C further is desirable.

[0039] In this invention, negatives may be developed by the so-called 1 component developing-negatives method for developing 1 component developer and a nothing electrostatic latent image by the toner independent, and may be developed by the 2 component developing-negatives method for developing an electrostatic latent image using 2 component developer which comes to mix a carrier with a toner. As a carrier used by the 2 component developing-negatives method, the same thing as the former, such as iron powder, a ferrite, and a glass bead, is mentioned. In addition, what covered resin is sufficient as these carriers. In this case, the resin used is Pori fluoridation carbon, a polyvinyl chloride, a polyvinylidene chloride, phenol resin, a polyvinyl acetal, silicone resin, etc. Anyway, generally a toner 1.5 – a 10.0 weight sections degree are suitable for the mixed rate of a toner and a carrier to the carrier 100 weight section. Although these may use what changed with developers of each color, it is necessary to make them into the amount of electrifications as the amount of electrifications of each color toner finally specified to said claim.

[0040] After mixing a component which was described above with mixers, such as a Henschel mixer, in manufacturing two or more toners of this invention, the method of carrying out heating kneading, carrying out grinding classification of the kneading object after cooling solidification, and obtaining desired mean particle diameter with a continuation kneading machine or kneading machines, such as a roll kneader, is desirable. There are other methods, such as a spray drying method, a polymerization method, and the microcapsule method. Furthermore, the toner obtained in this way can fully be mixed with a desired additive with mixers, such as a Henschel mixer, if needed, and a toner can be manufactured.

[0041]

[Example] Although this invention is concretely explained based on an example and the example of a comparison below, this invention is not limited only to these examples. Moreover, in the following examples, the section and % are weight criteria, as long as there is no notice especially.

[0042]

Example 1 <a yellow toner> Water The 600 sections C.I.Pigment yellow 180 The 1200 sections were well stirred with the flasher. The polyester resin (acid-number 3, hydroxyl value 25, Mn4500, Mw/Mn4.0, 60 Tg(s)) 1200 section was added here, the after [ 30 minute kneading ] xylene 1000 section was added at 150 degrees, after removing water and a xylene for further 1 hour (the xylene was set to 100 ppm or less), rolling cooling was carried out, the two pass was carried out by grinding and 3 more roll mill with the PARUPE riser, and the masterbatch pigment (MY-1) was obtained.

Polyester resin The 100 sections (the acid number 3, a hydroxyl value 25, Mn4500, Mw/Mn4, 60 Tg(s))

The above-mentioned masterbatch (MY-1) The 12 sections Electrification control agent (the ORIENT chemistry company make E-84) Melting kneading of the 3 section above-mentioned material was carried out by 2 roll mills after mixing by the mixer, and rolling cooling of the kneading object was carried out. Pneumatic elutriation (DS classifier: Japanese pneumatic industrial company make) by the collision board method (I type mill; Japanese pneumatic industrial company make) by the jet mill and the revolution style was performed after that, and the weighted mean particle size of 7.0 micrometers and 4 micrometers or less obtained several% of 7.5-piece yellow coloring particle. In addition, particle size distribution were measured with Coulter counter-TAIL of a coal-tar company.

The above-mentioned yellow coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 1.0 sections were mixed by the mixer and it considered as the yellow toner.

[0043]

<Magenta toner> Water The 600 sections C.I.Pigment RED 57:1 The 1200 sections were well stirred with the flasher. The polyester resin (acid-number 3, hydroxyl value 25, Mn4500, Mw/Mn4.0, 60 Tg(s)) 1200 section was added here, the after [ 30 minute kneading ] xylene 1000 section was added at 150 degrees, after removing water and a xylene for further 1 hour (the xylene was set to 100 ppm or less), rolling cooling was carried out, the two pass was carried out by grinding and 3 more roll mill with the PARUPE riser, and the masterbatch pigment (MM-1) was obtained.

Polyester resin The 100 sections (the acid number 3, a hydroxyl value 25, Mn4500, Mw/Mn4, 60 Tg(s))

The above-mentioned masterbatch (MM-1) The nine sections Electrification control agent (the ORIENT chemistry company make E-84) The weighted mean particle size of 7.0 micrometers and 4 micrometers or less obtained several% of 7.5-piece Magenta coloring particle for the three sections by the same method as said yellow coloring particle.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.8 sections were mixed by the mixer and it considered as the Magenta toner.

[0044]

<Cyanogen toner> Water The 600 sections C.I.Pigment blue 55:3 The 1200 sections were well stirred with the flasher. The polyester resin (acid-number 3, hydroxyl value 25, Mn4500, Mw/Mn4.0, 60 Tg(s)) 1200 section was added here, the after [ 30 minute kneading ] xylene 1000 section was added at 150 degrees, after removing water and a xylene for further 1 hour (the xylene was set to 100 ppm or less), rolling cooling was carried out, the two pass was carried out by grinding and 3 more roll mill with the PARUPE riser, and the masterbatch pigment (MC-1) was obtained.

Polyester resin The 100 sections (the acid number 3, a hydroxyl value 25, Mn4500, Mw/Mn4, 60 Tg(s))

The above-mentioned masterbatch (MC-1) The nine sections Electrification control agent (the ORIENT chemistry company make E-84) The weighted mean particle size of 6.9 micrometers and 4 micrometers or less obtained several% of 8.5-piece cyanogen coloring particle for the three sections by the same method as said yellow coloring particle.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (TS[ by Cabot Corp. ]- 720) The 0.6 sections were mixed by the mixer and it considered as the

cyanogen toner.

[0045]

<Black toner> Polyester resin The 100 sections (the acid number 3, a hydroxyl value 25, Mn4500, Mw/Mn4, 60 Tg(s))

Carbon black (PRINTEX70 by Cabot Corp.) The seven sections Electrification control agent (the ORIENT chemistry company make E-84) The weighted mean particle size of 7.1 micrometers and 4 micrometers or less obtained several% of 6.0-piece black coloring particle for the three sections by the same method as said yellow coloring particle.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.4 sections were mixed by the mixer and it considered as the black toner.

[0046] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine (a photo conductor belt, a middle imprint belt, those with a zinc stearate spreading device), and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Secondary \*\*\*\*\* was 30 g/cm.

Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, the absolute value of the amount of electrifications had fallen in order of yellow, a Magenta, cyanogen, and black in order of -22.0microC/g, -21.3microC/g, -20.1 C/g, -19.7microC/g, and development. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image is altogether clear to monochrome - 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile and it was a sharp image. Moreover, it could not check with a magnifier 30 times about an imprint omission and imprint BOSOTSUKI, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen.

[0047] The same yellow toner as the example 2 <yellow toner> example 1 was used.

<Cyanogen toner> The cyanogen coloring particle of an example 1 was used.

The above-mentioned coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.8 sections were mixed by the mixer and it considered as the cyanogen toner.

<Magenta toner> The Magenta coloring particle of an example 1 was used.

The above-mentioned coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.6 sections were mixed by the mixer and it considered as the Magenta toner.

<Black toner> The same black toner as an example 1 was used.

[0048] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, cyanogen, a Magenta, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, the absolute value of the amount of electrifications had fallen in order of yellow, cyanogen, a Magenta, and black in order of -22.0microC/g, -20.9microC/g, -20.5microC/g, -19.7microC/g, and development. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image is clear in all the colors of monochrome - 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile and it was a sharp image. Moreover, it could not check with a magnifier 30 times about an imprint omission and imprint BOSOTSUKI, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen.

[0049]

Example 3 <a black toner> Polyol resin The 100 sections (Mn3700, Mw/Mn4.2, 62 Tg(s))

Carbon black (Cabot make-PRINTEX70) The seven sections Electric charge control agent (ORIENT [ CORP. ] make: E-84) The weighted mean particle size of 6.7 micrometers and several% of 4-micrometer or less 9.5-piece particle [ black coloring ] were obtained for the four sections by the same method as said example 1.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 1.0 sections were mixed by the mixer and the black toner was obtained.

[0050]

<Magenta toner> Water The 600 sections C.I.Pigment RED 57:1 The 1200 sections were well stirred with the flasher. The polyol resin (Mn3700, Mw/Mn4.2, 62 Tg(s)) 1200 section was added here, the after [ 30 minute kneading ] xylene 1000 section was added at 150 degrees, after removing water and a xylene for further 1 hour (the xylene was set to 100 ppm or less), rolling cooling was carried out, the two pass was carried out by grinding and 3 more roll mill with the PARUPE riser, and the masterbatch pigment (MM-2) was obtained.

Polyol resin The 100 sections (Mn3700, Mw/Mn4.2, 62 Tg(s))

The above-mentioned masterbatch (MM-2) The nine sections Electrification control agent (the ORIENT chemistry company make E-84) The weighted mean particle size of 7.0 micrometers and 4 micrometers or less obtained several% of 8.5-piece Magenta coloring particle for the four sections by the same method as said example 1.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.8 sections were mixed by the mixer and it considered as the Magenta toner.

[0051]

<Yellow toner> Water The 600 sections C.I.Pigment yellow 180 The 1200 sections were well stirred with the flasher. The polyol resin (Mn3700, Mw/Mn4.2, 62 Tg(s)) 1200 section was added here, the after [ 30 minute kneading ] xylene 1000 section was added at 150 degrees, after removing water and a xylene for further 1 hour (the xylene was set to 100 ppm or less), rolling cooling was carried out, the two pass was carried out by grinding and 3 more roll mill with the PARUPE riser, and the masterbatch pigment (MY-2) was obtained.

Polyol resin The 100 sections (Mn3700, Mw/Mn4.2, 62 Tg(s))

The above-mentioned masterbatch (MY-2) The 12 sections Electrification control agent (the ORIENT chemistry company make E-84) The weighted mean particle size of 6.9 micrometers and 4 micrometers or less obtained several% of 6.5-piece yellow coloring particle for the four sections by the same method as said example 1.

The above-mentioned yellow coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.6 sections were mixed by the mixer and it considered as the yellow toner.

[0052]

<Cyanogen toner> Water The 600 sections C.I.Pigment blue 55:3 The 1200 sections were well stirred with the flasher. The polyol resin (Mn3700, Mw/Mn4.2, 62 Tg(s)) 1200 section was added here, the after [ 30 minute kneading ] xylene 1000 section was added at 150 degrees, after removing water and a xylene for further 1 hour (the xylene was set to 100 ppm or less), rolling cooling was carried out, the two pass was carried out by grinding and 3 more roll mill with the PARUPE riser, and the masterbatch pigment (MC-2) was obtained.

Polyol resin The 100 sections (Mn3700, Mw/Mn4.2, 62 Tg(s))

The above-mentioned masterbatch (MC-2) The nine sections Electrification control agent (the ORIENT chemistry company make E-84) The weighted mean particle size of 6.9 micrometers and 4 micrometers or less obtained several% of 8.5-piece cyanogen coloring particle for the four sections by the same method as said example 1.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.4 sections were mixed by the mixer and it considered as the cyanogen toner.

[0053] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of black, a Magenta, yellow, and cyanogen. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, the absolute value of the amount of electrifications had fallen in order of black, a Magenta, yellow, and cyanogen in order of -24.0microC/g, -23.3microC/g, -22.3microC/g, -20.9microC/g, and development. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained

print image is altogether clear to monochrome – 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile and it was a sharp image. Moreover, it could not check with a magnifier 30 times about an imprint omission and imprint BOSOTSUKI, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen.

[0054] The same toner as example 4 example 3 was used, and it mixed with the turbular mixer at a rate of the five sections to the carrier 100 section which used silicone resin as the surface coat also with each color at the ferrite particle with a mean particle diameter of 50 micrometers, and considered as the developer. The obtained two component developer was set to the digital full color copy (PURITERU 650 by Ricoh Co., Ltd.) reconstruction machine (a photo conductor drum, a middle imprint belt, those with a zinc stearate spreading device), and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of black, a Magenta, yellow, and cyanogen. Secondary \*\*\*\*\* in this case was 50 g/cm. Moreover, when the amount of electrifications of a developer was measured by the blowing off method, the absolute value of the amount of electrifications had fallen in order of black, a Magenta, yellow, and cyanogen in order of  $-30.1\text{microC/g}$ ,  $-29.1\text{microC/g}$ ,  $-27.9\text{microC/g}$ ,  $-26.5\text{microC/g}$ , and development. Moreover, although the obtained print image is altogether clear to monochrome – 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile and it was a sharp image. Moreover, it could not check with a magnifier 30 times about an imprint omission and imprint BOSOTSUKI, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen.

[0055] The same black toner as the example 5 <black toner> example 3 was used.

The same Magenta toner as the <Magenta toner> example 3 was used.

The same yellow coloring particle as the <yellow toner> example 3 was used.

The above-mentioned yellow coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 1.0 sections were mixed by the mixer and it considered as the yellow toner.

The same cyanogen toner as the <cyanogen toner> example 3 was used.

[0056] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of black, a Magenta, yellow, and cyanogen. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, in connection with the order of development, the absolute value of the amount of electrifications had fallen in order of black, a Magenta, yellow, and cyanogen except  $\text{C/g}$ ,  $-23.3\text{microC/g}$ ,  $-24.5\text{microC/g}$ ,  $-20.9\text{microC/g}$ , and yellow by  $-24.0\text{micro}$ . The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image was [ visually ] clear to monochrome – 4 color pile, when it observed the image edge section with the magnifier 30 times, it has checked Chile in the red used as a Magenta and 2 color piles of yellow and 3 color piles, and 4 color piles. Moreover, about an imprint omission, it could not check with a magnifier 30 times, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen.

[0057] The same yellow coloring particle as the example 6 <yellow toner> example 1 was used. The above-mentioned yellow coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: RY-50) The same Magenta coloring particle as the <Magenta toner> example 1 which mixed the 2.0 sections by the mixer and obtained the yellow toner was used.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil; RY-50) The 2.0 sections were mixed by the mixer and the Magenta toner was obtained.

<Cyanogen toner> The same cyanogen coloring particle as an example 1 was used.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: RY-50) The 1.8 sections were mixed by the mixer and it considered as the cyanogen toner.

<Black toner> The same black coloring particle as an example 1 was used.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: RY-50) The 1.6 sections were mixed by the mixer and it considered as the black toner.

[0058] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were - 22.0microC/g, -22.0microC/g, -20.5microC/g, and -19.9microC/g in order of yellow, a Magenta, cyanogen, and black. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image was [ visually ] clear to monochrome - 4 color pile, when it observed the image edge section with the magnifier 30 times, it has checked Chile in the red used as a Magenta and 2 color piles of yellow and 3 color piles, and 4 color piles. Moreover, about an imprint omission, it could not check with a magnifier 30 times, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen.

[0059] The same yellow coloring particle as the example 7 <yellow toner> example 1 was used. The above-mentioned yellow coloring particle. The 100 sections Fluid grant agent (Wacker make: H2000) The same Magenta coloring particle as the <Magenta toner> example 1 which mixed the 1.0 sections by the mixer and obtained the yellow toner was used.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 0.8 sections were mixed by the mixer and the Magenta toner was obtained.

<Cyanogen toner> The same cyanogen toner as an example 1 was used.

<Black toner> The same black toner as an example 1 was used.

[0060] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were - 24.0microC/g, -22.8microC/g, -20.2microC/g, and -19.7microC/g in order of yellow, a Magenta, cyanogen, and black. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image was [ visually ] clear to monochrome - 4 color pile, when it observed the image edge section with the magnifier 30 times, it has checked Chile in the red used as a Magenta and 2 color piles of yellow and 3 color piles, and 4 color piles. Moreover, about an imprint omission, it could not check with a magnifier 30 times, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen.

[0061] The same yellow toner as the example 8 <yellow toner> example 7 was used.

<Magenta toner> The same Magenta coloring particle as an example 1 was used.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: R972) The 0.8 sections were mixed by the mixer and the Magenta toner was obtained.

<Cyanogen toner> The same cyanogen toner as an example 1 was used.

<Black toner> The same black coloring particle as an example 1 was used.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: R972) The 0.4 sections were mixed by the mixer and the black toner was obtained.

[0062] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were - 24.0microC/g, -21.1microC/g, -20.2microC/g, and -19.0microC/g in order of yellow, a Magenta,



cyanogen, and black. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image is altogether clear to monochrome – 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile and it was a sharp image. Although some omission was seen by some omission and 4 color piles in the red to which a Magenta laps with yellow with a magnifier 30 times although it was not able to check visually about an imprint omission, the nonuniformity of an image did not have \*\*\*\*\* and natural complexion fogging, either.

[0063] The same toner as example 9 example 1 was used, and it mixed with the turbular mixer at a rate of the five sections to the carrier 100 section which used silicone resin as the surface coat also with each color at the ferrite particle with a mean particle diameter of 50 micrometers, and considered as the developer. Using the imaging machine which showed the obtained two component developer to drawing 1 (a photo conductor drum, a middle imprint drum, those with a zinc stearate spreading device), it set in order of the development of yellow, a Magenta, cyanogen, and black, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed. Secondary \*\*\*\*\* in this case was 50 g/cm. Moreover, when the amount of electrifications of a developer was measured by the blowing off method, the absolute value of the amount of electrifications had fallen in order of yellow, a Magenta, cyanogen, and black in order of  $-24.0\text{microC/g}$ ,  $-22.8\text{microC/g}$ ,  $-22.4\text{microC/g}$ ,  $-21.5\text{microC/g}$ , and development. Moreover, although the obtained print image is altogether clear to monochrome – 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile, is a sharp image and did not have natural complexion fogging, either. However, although it was not able to check visually about an imprint omission, on the whole, some imprint omission was checked also including monochrome with the magnifier 30 times.

[0064] The same yellow toner of the example 10 <yellow toner> example 7 was used.

<Magenta toner> The same Magenta toner as an example 7 was used.

<Cyanogen toner> The same cyanogen coloring particle as an example 1 was used.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 0.6 sections were mixed by the mixer and the cyanogen toner was obtained.

<Black toner> The same black coloring particle as an example 1 was used.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 0.4 sections were mixed by the mixer and the black toner was obtained.

[0065] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, it set in order of the development of yellow, a Magenta, cyanogen, and black, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed. Secondary \*\*\*\*\* in this case was 50 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, the absolute value of the amount of electrifications had fallen in order of yellow, a Magenta, cyanogen, and black in order of  $-24.0\text{microC/g}$ ,  $-22.8\text{microC/g}$ ,  $-22.4\text{microC/g}$ ,  $-21.5\text{microC/g}$ , and development. Moreover, although the obtained print image is altogether clear to monochrome – 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile and it did not have natural complexion fogging by the sharp image, either. However, although it was not able to check visually about an imprint omission, on the whole, some imprint omission was checked with the magnifier 30 times except the monochrome of black.

[0066] The same yellow coloring particle as the example 11 <yellow toner> example 1 was used. The above-mentioned yellow coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 1.4 sections were mixed by the mixer and the yellow toner was obtained.

<Magenta toner> The same Magenta coloring particle as an example 1 was used.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 1.2 sections were mixed by the mixer and the Magenta toner was obtained.

<Cyanogen toner> The same cyanogen coloring particle as an example 1 was used.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 1.0 sections were mixed by the mixer and the cyanogen toner was obtained.

<Black toner> The same black coloring particle as an example 1 was used.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 0.8 sections were mixed by the mixer and the black toner was obtained.

[0067] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were -28.0microC/g, -26.3microC/g, -23.8microC/g, and -23.0microC/g in order of yellow, a Magenta, cyanogen, and black. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image was [ visually ] clear to monochrome - 4 color pile, when it observed the image edge section with the magnifier 30 times, it has checked Chile in all the heavy images except monochrome. Moreover, about an imprint omission, it could not check with a magnifier 30 times, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen.

[0068] The toner same also with example 12 each color as an example 1 was used. The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Furthermore, the zinc stearate spreading device to a middle imprint object was removed and used. When the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were -22.0microC/g, -21.3microC/g, -20.1microC/g, and -19.7microC/g in the result same in order of yellow, a Magenta, cyanogen, and black as an example 1. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image is altogether clear to monochrome - 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile, is a sharp image and did not have natural complexion fogging, either. However, although it was not able to check visually about an imprint omission, on the whole, some imprint omission was checked with the magnifier 30 times except the monochrome of black.

[0069] The same yellow coloring particle as the example 13 <yellow toner> example 1 was used. The above-mentioned yellow coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: TS-720) The 1.4 sections were mixed by the mixer and the yellow toner was obtained.

<Magenta toner> The same Magenta coloring particle as an example 1 was used.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil; TS-720) The 1.2 sections were mixed by the mixer and the Magenta toner was obtained.

<Cyanogen toner> The same cyanogen coloring particle as an example 1 was used.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: TS-720) The 1.0 sections were mixed by the mixer and the cyanogen toner was obtained.

<Black toner> The same black coloring particle as an example 1 was used.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: TS-720) The 0.8 sections were mixed by the mixer and the black toner was obtained.

[0070] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm<sup>2</sup>. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, the absolute value



of the amount of electrifications had fallen in order of black, a Magenta, yellow, and cyanogen in order of  $-30.0\text{microC/g}$ ,  $-27.3\text{microC/g}$ ,  $-24.3\text{microC/g}$ ,  $-23.2\text{microC/g}$ , and development. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image is altogether clear to monochrome – 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile and it was a sharp image. Moreover, it could not check with a magnifier 30 times about an imprint omission and imprint BOSOTSUKI, either, and neither the nonuniformity of an image nor a natural complexion fogging was seen. [0071] About example of comparison 1 yellow, a Magenta, and cyanogen, the same toner as an example 1 was used.

<Black toner> The same black coloring particle as an example 1 was used.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 1.2 sections were mixed by the mixer and the black toner was obtained.

[0072] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Furthermore, the zinc stearate spreading device to a middle imprint object was removed and used. When the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were  $-22.0\text{microC/g}$ ,  $-21.3\text{microC/g}$ ,  $-20.1\text{microC/g}$ , and  $-23.5\text{microC/g}$  in order of yellow, a Magenta, cyanogen, and black. The thin layer nature on a developing roller was uniform, and good. Moreover, although all of the monochrome which does not contain black – 3 color piles of the obtained print image are clear and the image edge section was observed with the magnifier 30 times, there was not Chile and it was a sharp image. However, about the heavy image containing black, it was so bad that viewing could also check Chile altogether, was equal to use, and was not a \*\*\*\* thing. Moreover, about an imprint omission, it could not check with a magnifier 30 times, either, and neither the nonuniformity of an image nor natural complexion fogging was seen.

[0073] The same yellow toner as the example 2 <yellow toner> example 7 of a comparison was used.

<Magenta toner> The same Magenta coloring particle as an example 1 was used.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 1.0 sections were mixed by the mixer and the Magenta toner was obtained.

<Cyanogen toner> The same cyanogen toner as an example 11 was used.

<Black toner> The same black coloring particle as an example 1 was used.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 1.0 sections were mixed by the mixer and the black toner was obtained.

[0074] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were  $-24.0\text{microC/g}$ ,  $-24.2\text{microC/g}$ ,  $-23.8\text{microC/g}$ , and  $-23.9\text{microC/g}$  in order of yellow, a Magenta, cyanogen, and black. The thin layer nature on a developing roller was uniform, and good. Moreover, although the obtained print image was good about natural complexion fogging, by heavy images other than monochrome, Chile was altogether severe and especially 4 color piles were not what can be borne. Moreover, it piled up also about the imprint omission, and also visually the imprint omission could see the image, especially the imprint nonuniformity of a Magenta color was severe.

[0075] The same yellow coloring particle as the example 3 <yellow toner> example 3 of a comparison was used.

The above-mentioned yellow coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 1.0 sections were mixed by the mixer and the yellow toner was obtained.

<Magenta toner> The same Magenta coloring particle as an example 3 was used.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (Wacker make: H2000) The 0.8 sections were mixed by the mixer and the Magenta toner was obtained.  
 <Cyanogen toner> The same cyanogen coloring particle as an example 3 was used.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.8 sections were mixed by the mixer and the cyanogen toner was obtained.

<Black toner> The same black coloring particle as an example 3 was used.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.6 sections were mixed by the mixer and the black toner was obtained.

[0076] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were - 26.0microC/g, -25.3microC/g, -23.1microC/g, and -22.4microC/g in order of yellow, a Magenta, cyanogen, and black. The thin layer nature on a developing roller was uniform, and good.

Moreover, although there was some Chile by the part with which a Magenta and cyanogen lap, when the image edge section is observed with a magnifier 30 times although the obtained print image was altogether clear to monochrome - 4 color pile and there was also no natural complexion fogging, it was an image sharp on the whole. however, the blue to which a Magenta laps with cyanogen about an imprint omission — if — there was an imprint omission to the extent that it can check visually.

[0077] The same yellow toner of the example 4 <yellow toner> example 1 of a comparison was used.

<Magenta toner> Polyester resin The 100 sections (the acid number 3, a hydroxyl value 25, Mn4500, Mw/Mn4, 60 Tg(s))

Magenta masterbatch (MM-1) The nine sections Electrification control agent (the ORIENT chemistry company make E-84) The weighted mean particle size of 7.0 micrometers and 4 micrometers or less obtained several% of 8.0-piece Magenta coloring particle for the two sections by the same method as the yellow coloring particle of example 1 publication.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (Cabot [ Corp. ] make: TS-720) The 0.8 sections were mixed by the mixer and it considered as the Magenta toner.

<Cyanogen toner> The same cyanogen toner as an example 1 was used.

<Black toner> The same black toner as an example 1 was used.

[0078] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were - 22.0microC/g, -18.0microC/g, -20.2microC/g, and -19.5microC/g in order of yellow, a Magenta, cyanogen, and black. The thin layer nature on a developing roller was uniform, and good.

Moreover, it was blue, imprint Chile was severe, and especially the obtained print image was not the thing with which a Magenta and cyanogen lap and which can be equal to use. However, about an imprint omission, it could not check with a magnifier 30 times, either, and neither the nonuniformity of an image nor natural complexion fogging was seen.

[0079] The same yellow coloring particle as the example 5 <yellow toner> example 1 of a comparison was used.

The above-mentioned yellow coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil: RY-50) The 1.0 sections were mixed by the mixer and the yellow toner was obtained.

<Magenta toner> The same Magenta coloring particle as an example 1 was used.

The above-mentioned Magenta coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil; RY-50) The 0.8 sections were mixed by the mixer and the Magenta toner was obtained.

<Cyanogen toner> The same cyanogen coloring particle as an example 1 was used.

The above-mentioned cyanogen coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil; RY-50) The 0.6 sections were mixed by the mixer and the cyanogen toner was obtained.

<Black toner> The same black coloring particle as an example 1 was used.

The above-mentioned black coloring particle The 100 sections Fluid grant agent (the product made from Japanese Aerosil; RY-50) The 0.4 sections were mixed by the mixer and the black toner was obtained.

[0080] The obtained 1 component developer was set to the digital full color printer (Ipsio[ by Ricoh Co., Ltd. ] COLOR5000) reconstruction machine, and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of yellow, a Magenta, cyanogen, and black. Under the present circumstances, secondary \*\*\*\*\* was 30 g/cm. Moreover, when the amount of electrifications and toner coating weight on a developing roller were measured with the suction method, they were - 14.5microC/g, -14.0microC/g, -13.2microC/g, and -11.8microC/g in order of yellow, a Magenta, cyanogen, and black. The thin layer nature on a developing roller was uniform, and good.

Moreover, although the obtained print image is altogether clear to monochrome - 4 color pile and the image edge section was observed with the magnifier 30 times, there was not Chile and it was a sharp image. Moreover, although it could not check with a magnifier 30 times about an imprint omission, either and the nonuniformity of an image was not seen, either, it is the image with which fogging to the natural complexion section is conspicuous.

[0081] The same yellow toner as the example 6 <yellow toner> example 13 of a comparison was used.

<Magenta toner> The same Magenta toner as an example 13 was used.

<Cyanogen toner> The same cyanogen toner as an example 13 was used.

<Black toner> The same black toner as an example 13 was used.

[0082] The toner of each obtained color was used, and it mixed with the turbular mixer at a rate of the five sections to the carrier 100 section which used silicone resin as the surface coat also with each color at the ferrite particle with a mean particle diameter of 50 micrometers, and considered as the developer.

[0083] The obtained two component developer was set to the digital full color copy (PURITERU 650 by Ricoh Co., Ltd.) reconstruction machine (a photo conductor drum, a middle imprint belt, those with a zinc stearate spreading device), and the full color image of monochrome, 2 color piles, 3 color piles into which black does not go, and 4 color piles was formed in order of the development of black, a Magenta, yellow, and cyanogen. Secondary \*\*\*\*\* in this case was 50 g/cm. Moreover, when the amount of electrifications of a developer was measured by the blowing off method, the absolute value of the amount of electrifications had fallen in order of yellow, a Magenta, cyanogen, and black in order of -42.0microC/g, -40.7microC/g, -37.8microC/g, -35.4microC/g, and development. The image clear about monochrome was obtained, and the obtained print image was clear about the heavy image of cyanogen and black, and the image of two colors - 4 color piles with which yellow and a Magenta are used had severe imprint Chile also in viewing. About an imprint omission and imprint BOSOTSUKI, it could not check with a magnifier 30 times, either, and neither the nonuniformity of an image nor natural complexion fogging was seen.

[0084] What summarized above-mentioned examples 1-13 and examples 1-6 of a comparison is shown in a table 1 - a table 4.

[0085]

[A table 1]

	実施例1	実施例2	実施例3	実施例4	実施例5
現像方式	1成分	1成分	1成分	2成分	1成分
線圧 (g/cm)	30	30	30	50	30
感光体	ベルト	ベルト	ベルト	ドラム	ベルト
中間転写体	ベルト	ベルト	ベルト	ベルト	ベルト
ステアリン酸亜鉛塗布機構	あり	あり	あり	あり	あり
結着樹脂	ホリエステル	ホリエステル	ホリオール	ホリオール	ホリオール
第1現像	Y	Y	Bk	Bk	Bk
シリカ	TS720	TS720	TS720	TS720	TS721
量(wt%)	1.0	1.0	1.0	1.0	1.0
Q/M( $\mu$ g/g)	-22.0	-22.0	-24.0	-30.1	-24.0
第2現像	M	C	M	M	M
シリカ	TS720	TS720	TS720	TS720	TS721
量(wt%)	0.8	0.8	0.8	0.8	0.8
Q/M( $\mu$ g/g)	-21.3	-20.9	-23.3	-29.1	-23.3
第3現像	C	M	Y	Y	Y
シリカ	TS720	TS720	TS720	TS720	TS721
量(wt%)	0.6	0.6	0.6	0.6	1.0
Q/M( $\mu$ g/g)	-20.1	-20.5	-22.3	-27.9	-24.5
第4現像	Bk	Bk	C	C	C
シリカ	TS720	TS720	TS720	TS720	TS721
量(wt%)	0.4	0.4	0.4	0.4	0.4
Q/M( $\mu$ g/g)	-19.7	-19.7	-20.9	-26.5	-20.9
転写チリ	目視	良好	良好	良好	良好
	ルーペ	良好	良好	良好	Red で若干
転写抜け	目視	良好	良好	良好	良好
	ルーペ	良好	良好	良好	良好
地肌かぶり		良好	良好	良好	良好

[A table 2]

	実施例6	実施例7	実施例8	実施例9	実施例10
現像方式	1成分	1成分	1成分	2成分	1成分
線圧 (g/cm)	30	30	30	50	50
感光体	ベルト	ベルト	ベルト	ドラム	ドラム
中間転写体	ベルト	ベルト	ベルト	ドラム	ドラム
ステアリン酸亜鉛塗布機構	あり	あり	あり	あり	あり
結着樹脂	ホリエステル	ホリエステル	ホリエステル	ホリエステル	ホリエステル
第1現像	Y	Y	Y	Y	Y
シリカ	RY50	H2000	H2000	TS720	H2000
量(wt%)	2.0	1.0	1.0	1.0	1.0
Q/M( $\mu$ g/g)	-22.0	-24.0	-24.0	-24.0	-24.0
第2現像	M	M	M	M	M
シリカ	RY50	H2000	R972	TS720	H2000
量(wt%)	2.0	0.8	0.8	0.8	0.8
Q/M( $\mu$ g/g)	-22.0	-22.8	-21.1	-22.8	-22.8
第3現像	C	C	C	C	C
シリカ	RY50	TS720	TS720	TS720	H2000
量(wt%)	1.8	0.6	0.6	0.6	0.6
Q/M( $\mu$ g/g)	-20.5	-20.2	-20.2	-22.4	-22.4
第4現像	Bk	Bk	Bk	Bk	Bk
シリカ	RY50	TS720	R972	TS720	H2000
量(wt%)	1.6	0.4	0.4	0.4	0.4
Q/M( $\mu$ g/g)	-19.9	-19.7	-19.0	-21.5	-21.5
転写チリ	目視	良好	良好	良好	良好
	ルーペ	Red で若干	Red で若干	良好	良好
転写抜け	目視	良好	良好	良好	良好
	ルーペ	良好	Redで 若干	全体的に 若干	Black 以外全体
地肌かぶり		良好	良好	良好	良好

[A table 3]

		実施例11	実施例12	実施例13	比較例1	比較例2
現像方式		1成分	1成分	1成分	1成分	1成分
線圧 (g/cm)		30	30	30	30	30
感光体		ドラム	ベルト	ベルト	ベルト	ベルト
中間転写体		ドラム	ベルト	ベルト	ベルト	ベルト
ステアリン酸亜鉛塗布機構		あり	なし	あり	なし	あり
結着樹脂		ホリスエステル	ホリスエステル	ホリスエステル	ホリスエステル	ホリスエステル
第1現像		Y	Y	Y	Y	Y
シリカ		H2000	TS720	TS720	TS720	H2000
量(wt%)		1.4	1.0	1.4	1.0	1.0
Q/M( $\mu$ g/g)		-28.0	-22.0	-30.0	-22.0	-24.0
第2現像		M	M	M	M	M
シリカ		H2000	TS720	TS720	TS720	H2000
量(wt%)		1.2	0.8	1.2	0.8	1.0
Q/M( $\mu$ g/g)		-26.3	-21.3	-27.3	-21.3	-24.2
第3現像		C	C	C	C	C
シリカ		H2000	TS720	TS720	TS720	H2000
量(wt%)		1.0	0.6	1.0	0.6	1.0
Q/M( $\mu$ g/g)		-23.8	-20.1	-24.3	-20.1	-23.8
第4現像		Bk	Bk	Bk	Bk	Bk
シリカ		H2000	TS720	TS720	TS720	H2000
量(wt%)		0.8	0.4	0.8	1.2	1
Q/M( $\mu$ g/g)		-23.0	-19.7	-23.2	-23.5	-23.9
転写チリ	目視	良好	良好	良好	Bkトナーが重なる ところではチリが ひどい	重ね画像は全て
	ルーペ	重ね部分は 全体的に	良好	良好	—	—
転写抜け	目視	良好	良好	良好	良好	全体的に (特にマゼンタがひどい)
	ルーペ	良好	Black 以外全体	良好	良好	—
地肌かぶり		良好	良好	良好	良好	良好

[A table 4]

		比較例3	比較例4	比較例5	比較例6
現像方式		1成分	1成分	1成分	2成分
線圧 (g/cm)		30	30	30	50
感光体		ベルト	ベルト	ベルト	ドラム
中間転写体		ベルト	ベルト	ベルト	ベルト
ステアリン酸亜鉛塗布機構		あり	あり	あり	あり
結着樹脂		ポリオール	ポリエステル	ポリエステル	ポリエステル
第1現像		Y	Y	Y	Y
シリカ		H2000	TS720	RY50	TS720
量(wt%)		1.0	1.0	1.0	1.4
Q/M( $\mu$ C/g)		-26.0	-22.0	-14.5	-42.0
第2現像		M	M	M	M
シリカ		H2000	TS720	RY50	TS720
量(wt%)		0.8	0.8	0.8	1.2
Q/M( $\mu$ C/g)		-25.3	-18.0	-14.0	-40.7
第3現像		C	C	C	C
シリカ		TS720	TS720	RY50	TS720
量(wt%)		0.8	0.6	0.6	1.0
Q/M( $\mu$ C/g)		-23.1	-20.2	-13.2	-37.8
第4現像		Bk	Bk	Bk	Bk
シリカ		TS720	TS720	RY50	TS720
量(wt%)		0.6	0.4	0.4	0.8
Q/M( $\mu$ C/g)		-22.4	-19.5	-11.8	-35.4
転写チリ	目視	良好	Blueでひどい	良好	YトナーとMトナーが重なるところでチリがひどい
	ルーペ	Blueで若干	—	良好	—
転写抜け	目視	Blueでひどい	良好	良好	良好
	ルーペ	—	良好	良好	良好
地肌かぶり		良好	良好	ひどい	良好

[0086]

[Effect of the Invention] As mentioned above, according to this invention, so that clearly from details and concrete explanation In formation of the full color image which uses a middle imprint method and a contact (2nd order) imprint method By adjusting the amount of toner electrifications in the toner of four colors which are yellow, cyanogen, a Magenta, and black, and optimizing the addition and the amount of toner electrifications of a fluid grant agent in order of development further The toner for electrostatic-charge image development used for the image formation method, the image formation equipment, and it which can form an image with high repeatability without imprint Chile, an imprint omission, imprint BOSOTSUKI, and a natural complexion fogging can be offered.

[Translation done.]

**\* NOTICES \***

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the mimetic diagram of the example of the full color image formation equipment of this invention.

[Drawing 2] It is the mimetic diagram of another example of the full color image formation equipment of this invention.

[Description of Notations]

( Drawing 1 )

1a-1d: Development counter

2: Photo conductor drum

3: Middle imprint drum

4: Imprint roller

5: Fixing roller

6: Imprint member

( Drawing 2 )

1a-1d: Development counter

2: Photo conductor belt

3: Middle imprint belt

4: Imprint roller

5: Fixing roller

6: Imprint member

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[Translation done.]

**\* NOTICES \***

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1.This document has been translated by computer. So the translation may not reflect the original precisely.

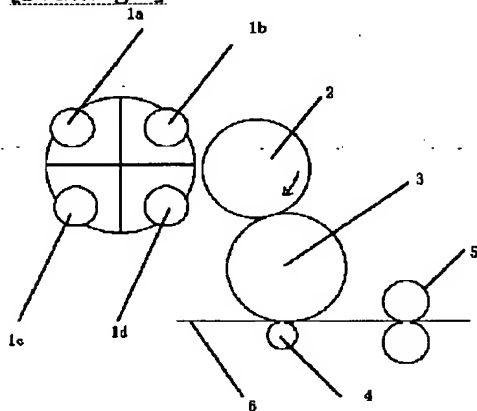
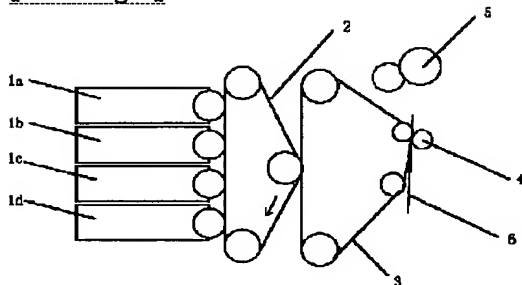
2.\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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**DRAWINGS**

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**[Drawing 1]****[Drawing 2]**

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**[Translation done.]**



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G03G 9/08	375	15/01	114A 2H030
15/01	114	15/16	103 2H035
15/16	103	21/00	350 2H200
21/00	350	9/08	361
審査請求 未請求 請求項の数16 O L (全23頁)			

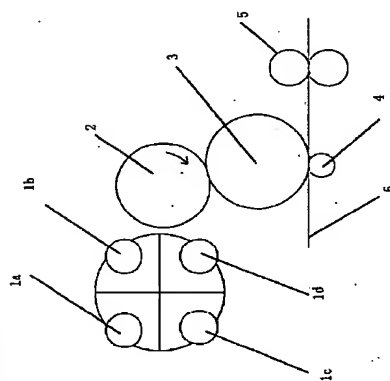
(21) 出願番号	特願2001-72508(P2001-72508)	(71) 出願人	000008747 株式会社リコー
(22) 出願日	平成13年3月14日(2001.3.14)	(72) 発明者	株式会社リコー 内野 理 東京都大田区中馬込1丁目3番6号 株式会社リコー内 伏見 寛之 東京都大田区中馬込1丁目3番6号 株式会社リコー内 井理士 池浦 敬明

(54) 【発明の名称】 画像形成方法及び画像形成装置並びに静電潜像現像用トナー

(57) 【要約】 (修正有)

【課題】 転写チリ、転写抜け、転写ボツツキおよび地肌かぶりのないフルカラーの画像形成方法、画像形成装置及びトナーを提供する。

【解決手段】 中間転写体上のトナー像を一括して転写部材に2次転写し、次いで転写部材上のトナーを定着させる際、フルカラーの再現をイエロー、シアン、マゼンタの3色重ねで行い、黒のみ単色で使用するフルカラー画像形成方法において、(a) シアンとマゼンタの現像順の早いほうのトナーをA、現像順の遅いほうのトナーをBとしたとき、流動化付与剤の添加量がA>Bであり、(b) この時のトナー帯電量の絶対値  $|Q_A/m|$  が、 $|Q_B/m| > |Q_A/m|$  であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$  であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成方法。



【特許請求の範囲】

【請求項1】 イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電潜像担持体上に静電潜像を形成し、これをカラートナーで現像し、該静電潜像担持体上のトナー像を中間転写体に1次転写を行なった後、該中間転写体上のトナー像を一括して転写部材に2次転写し、次いで転写部材上のトナーを定着させる際、フルカラーの再現をイエロー、シアン、マゼンタの3色重ねで行い、黒のみ単色で使用するフルカラー画像形成方法において、(a) フルカラートナーは少なくとも結着樹脂、着色材、更に流動化付与剤を含有し、シアンとマゼンタの現像順の早いほうのトナーをA、現像順の遅いほうのトナーをBとしたとき、流動化付与剤の添加量がA>Bであり、(b) この時のトナー帯電量の絶対値  $|Q_A/m|$  が、 $|Q_B/m| > |Q_A/m|$  であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$  であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成方法。

【請求項2】 イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電潜像担持体上に静電潜像を形成し、これをカラートナーで現像し、該静電潜像担持体上のトナー像を中間転写体に1次転写を行なった後、該中間転写体上のトナー像を転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着するフルカラー画像形成方法において、(a) フルカラートナーは少なくとも結着樹脂、着色材、更に流動化付与剤を含有し、シアン、マゼンタ、黒のうちのひとつも現像順の早いトナーをA、2番目のトナーをB、最も現像順の遅いトナーをCとしたとき、流動化付与剤の添加量がA>B>Cであり、(b) この時のトナー帯電量の絶対値  $|Q_A/m|$  が、 $|Q_B/m|$  が、 $|Q_C/m|$  が、 $|Q_A/m| > |Q_B/m| > |Q_C/m|$  であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$  であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成方法。

【請求項3】 イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電潜像担持体上に静電潜像を形成し、これをカラートナーで現像し、該静電潜像担持体上のトナー像を中間転写体に1次転写を行なった後、該中間転写体上のトナー像を転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着するフルカラー画像形成方法において、(a) フルカラートナーは少なくとも結着樹脂、着色材、更に流動化付与剤を含有し、イエロー、シアン、マゼンタ、黒のうちのひとつも現像順の早いトナーをA、2番目のトナーをB、3番目のトナーをC、最も現像順の遅いトナーをDとしたとき、流動化付与剤の添加量がA>B>C>Dで

あり、(b) この時のトナー帯電量の絶対値  $|Q_A/m|$  が、 $|Q_B/m|$  が、 $|Q_C/m|$  が、 $|Q_D/m|$  が、 $|Q_A/m| > |Q_B/m| > |Q_C/m| > |Q_D/m|$  であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$  であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成方法。

【請求項4】 前記中間転写体が中間転写ベルトであることを特徴とする請求項1～3のいずれかに記載の画像形成方法。

【請求項5】 前記静電潜像担持体が感光体ベルトであることを特徴とする請求項1～4のいずれかに記載の画像形成方法。

【請求項6】 前記中間転写体がステアリン酸亜鉛を微量塗布したものであることを特徴とする請求項1～5のいずれかに記載の画像形成方法。

【請求項7】 イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電潜像担持体上に静電潜像を形成し、これをカラートナーで現像し、該静電潜像担持体上のトナー像を中間転写体に1次転写を行

なった後、該中間転写体上のトナー像を一括して転写部材に2次転写し、次いで転写部材上のトナーを定着させる際、フルカラーの再現をイエロー、シアン、マゼンタの3色重ねで行い、黒のみ単色で使用するフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色材、更に流動化付与剤を含有し、シアンとマゼンタの現像順の早いほうのトナーをA、現像順の遅いほうのトナーをBとしたとき、流動化付与剤の添加量がA>Bであり、(b) この時のトナー帯電量の絶対値  $|Q_A/m|$  が、 $|Q_B/m|$  が、 $|Q_A/m| > |Q_B/m|$  であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$  であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成装置。

【請求項8】 イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電潜像担持体上に静電潜像を形成し、これをカラートナーで現像し、該静電潜像担持体上のトナー像を中間転写体に1次転写を行なった後、該中間転写体上のトナー像を転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着するフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色材、更に流動化付与剤を含有し、シアン、マゼンタ、黒のうちのひとつも現像順の早いトナーをA、2番目のトナーをB、最も現像順の遅いトナーをCとしたとき、流動化付与剤の添加量がA>B>Cであり、(b) この時のトナー帯電量の絶対値  $|Q_A/m|$  が、 $|Q_B/m|$  が、 $|Q_C/m|$  が、 $|Q_A/m| > |Q_B/m| > |Q_C/m|$  であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$  であ



いて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写し、次いで転写部材上のトナーを定着する際、フルカラーの再現をイエロー、シアン、マゼンタの3色重ねで行い、黒のみ単色で、トナー像を転写部材へ転写する方式である。

(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、シアンとマゼンタの現像の早いトナーをA、現像の遅いトナーをBとしたとき、流動化付与剤の添加量が $A > B$ であり、(b) この時のトナー帯電量の絶対値 $|Q_A/m|$ 、 $|Q_B/m|$ が、 $|Q_A/m| > |Q_B/m|$ であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$ であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写する方式であることを特徴とする画像形成装置が提供される。

【0014】また、本発明によれば、イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着する方式のフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、シアン、マゼンタ、黒のうちの少なくとも1つのトナーをA、2番目のトナーをB、最も現像の早いトナーをCとしたとき、流動化付与剤の添加量が $A > B > C$ であり、(b) この時のトナー帯電量の絶対値 $|Q_A/m|$ 、 $|Q_B/m|$ 、 $|Q_C/m|$ が、 $|Q_A/m| > |Q_B/m| > |Q_C/m|$ であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$ であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写する方式であることを特徴とする画像形成装置が提供される。

【0015】また、本発明によれば、イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着する方式のフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、シアン、マゼンタ、黒のうちの少なくとも1つのトナーをA、2番目のトナーをB、最も現像の早いトナーをCとしたとき、流動化付与剤の添加量が $A > B > C$ であり、(b) この時のトナー帯電量の絶対値 $|Q_A/m|$ 、 $|Q_B/m|$ 、 $|Q_C/m|$ が、 $|Q_A/m| > |Q_B/m| > |Q_C/m|$ であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$ であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写する方式であることを特徴とする画像形成装置が提供される。

【0016】また、本発明によれば、イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着する方式のフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、イエロー、シアン、マゼンタ、黒のうちの少なくとも1つのトナーをA、2番目のトナーをB、3番目のトナーをC、最も現像の早いトナーをDとしたとき、流動化付与剤の添加量が $A > B > C > D$ であり、(b) この時のトナ

の現像の早いトナーをA、現像の遅いトナーをBとしたとき、流動化付与剤の添加量が $A > B$ であり、(b) この時のトナー帯電量の絶対値 $|Q_A/m|$ 、 $|Q_B/m|$ が、 $|Q_A/m| > |Q_B/m|$ であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$ であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成装置が提供される。

【0011】また、本発明によれば、イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着するフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、シアン、マゼンタ、黒のうちの少なくとも1つのトナーをA、2番目のトナーをB、最も現像の早いトナーをCとしたとき、流動化付与剤の添加量が $A > B > C$ であり、(b) この時のトナー帯電量の絶対値 $|Q_A/m|$ 、 $|Q_B/m|$ 、 $|Q_C/m|$ が、 $|Q_A/m| > |Q_B/m| > |Q_C/m|$ であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$ であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成装置が提供される。

【0012】また、本発明によれば、イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着するフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、イエロー、シアン、マゼンタ、黒のうちの少なくとも1つのトナーをA、2番目のトナーをB、3番目のトナーをC、最も現像の早いトナーをDとしたとき、流動化付与剤の添加量が $A > B > C > D$ であり、(b) この時のトナー帯電量の絶対値 $|Q_A/m|$ 、 $|Q_B/m|$ 、 $|Q_C/m|$ 、 $|Q_D/m|$ が、 $|Q_A/m| > |Q_B/m| > |Q_C/m| > |Q_D/m|$ であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$ であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成装置が提供される。

【0013】また、本発明によれば、イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着する方式のフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、イエロー、シアン、マゼンタ、黒のうちの少なくとも1つのトナーをA、2番目のトナーをB、最も現像の早いトナーをCとしたとき、流動化付与剤の添加量が $A > B > C$ であり、(b) この時のトナー帯電量の絶対値 $|Q_A/m|$ 、 $|Q_B/m|$ 、 $|Q_C/m|$ が、 $|Q_A/m| > |Q_B/m| > |Q_C/m|$ であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$ であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成装置が提供される。

【0014】また、本発明によれば、イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着する方式のフルカラー画像形成装置において、(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、シアン、マゼンタ、黒のうちの少なくとも1つのトナーをA、2番目のトナーをB、最も現像の早いトナーをCとしたとき、流動化付与剤の添加量が $A > B > C$ であり、(b) この時のトナー帯電量の絶対値 $|Q_A/m|$ 、 $|Q_B/m|$ 、 $|Q_C/m|$ が、 $|Q_A/m| > |Q_B/m| > |Q_C/m|$ であり、(c)  $15 \mu C/g < |Q_A/m| < 40 \mu C/g$ であり、(d) 2次転写は転写バイアスが印加された転写装置を3g/cm以上で当接させて、トナー像を転写部材へ転写することを特徴とする画像形成装置が提供される。

紙の前縁端で過度差を生ずる、またはゴーストが現れるなど像安定性が悪くなる不具合がある。

【0008】これらのことから、転写チリについては、画像処理技術によってフルカラーをイエロー、シアン、マゼンタで再現し、黒色は黒のみで再現するようにし、重ね転写の回数減らすことや、墨入れを行うことで色重ねの度を減らすように設定するなどの手段がとられていたが、十分な効果はない。また現像色はイエロー、マゼンタ、シアン、ブラックの4色でフルカラーを作成する場合はその色目から、ブラック、マゼンタ、シアン、イエローの順に目立ちやすいが、ブラックは色味を行なうことが少ないことから、マゼンタ、及びシアンの中から最も目立ちやすい色は転写チリが非常に目立ち易くなるが、イエローを後から重ねる際は比較的に目立ちにくく、画像再現性には大きく影響しない。

【0009】  
【発明が解決しようとする課題】 本発明の目的は中間転写方式を用いたフルカラーの画像形成方法において、当接転写時に発生する転写抜けやトナーによる転写チリ等の上記問題を解決し、色ムラ、地肌がぶりがなくカラーバランスのとれた高画質が得られる画像形成方法を提案することにある。また本発明の目的は中間転写方式を用いたフルカラー画像形成方式の画像形成装置において、当接転写時に発生する転写抜けやトナーによる転写チリ等の上記問題を解決し、色ムラ、地肌がぶりがなくカラーバランスのとれた高画質が得られる画像形成装置を提供することにある。更に本発明の目的は中間転写方式を用いた画像形成に使用するトナーにおいて、当接転写時に発生する転写抜けやトナーによる転写チリ等の上記問題を解決することのできる静電増像用トナーを提供することにある。

【0010】  
【課題を解決するための手段】 本発明者等は鋭意研究を重ねた結果、転写ポンジキ、転写抜けや転写チリのない安定した画品質特性を出力し得るためには、中間転写、後転写等において各色トナーの流動化付与剤の添加量、及びトナー帯電量を調整し、さらに現像時に最適化するにより、上記目的を達成しうることを見出し、本発明を完成するに至った。即ち、本発明によれば、イエロー、シアン、マゼンタ、黒の4色の現像部を有し、それぞれについて静電増像担持体上に静電増像を形成し、これをカラートナーで現像し、該静電増像担持体上のトナー像を中間転写体に1次転写を行った後、該中間転写体上のトナー像を一括して転写部材に2次転写（一括転写）し、次いで転写部材上のトナーを定着する際、フルカラーの再現をイエロー、シアン、マゼンタの3色重ねで行い、黒のみ単色で使用するフルカラー画像形成方法において、(a) フルカラートナーは少なくとも結着樹脂、着色剤、更に流動化付与剤を含有し、シアンとマゼンタ







をミキサーで混合し、シアントナーとした。  
(マゼンタナー) 実施例1のマゼンタ着色粒子を使用\*

上記着色粒子

流動性付与剤 (キャボット社製: TS-720)

をミキサーで混合し、マゼンタナーとした。

(ブラックトナー) 実施例1と同様のブラックトナーを

使用した。

[0048] 得られた一成分現像剤をデジタルフルカラー

ープリンター (リコー社製 Ipsi COLOR 50

00) 改造機にセットし、イエロー、シア、マゼン

タ、ブラックの現像剤で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また現

像ローラー上の帯電量、及びトナー付着量を吸引法によ

り測定したところ、イエロー、シア、マゼンタ、プラ※

実施例3

(ブラックトナー)

ポリオール樹脂

(Mn 3700, Mw/Mn 4. 2, Tg 62度)

カーボンブラック (キャボット社製: PRINTEX 70)

荷電制御剤 (オリエント社製: E-84)

を前記実施例1と同様の方法で重量平均粒径6. 7μ

m、4μm以下9. 5個数のブラック着色粒子を得

た。

上記ブラック着色粒子

流動性付与剤 (キャボット社製: TS-720)

をミキサーで混合し、ブラックトナーを得た。

(マゼンタナー)

水

C. I. Pigment RED 57:1

をフラッシュャーでよく攪拌した。ここにポリオール樹脂 30

(Mn 3700, Mw/Mn 4. 2, Tg 62度) 12

00部を加え、150度で30分湿練後キシレン100

0部を加え、更に1時間、水とキシレンを除去後 (キシ

ン)

上記マゼンタ着色粒子

流動性付与剤 (キャボット社製: TS-720)

をミキサーで混合し、マゼンタナーとした。

(イエロートナー)

水

C. I. Pigment yellow 180

をフラッシュャーでよく攪拌した。ここにポリオール樹脂

(Mn 3700, Mw/Mn 4. 2, Tg 62度) 12

00部を加え、150度で30分湿練後キシレン100

0部を加え、更に1時間、水とキシレンを除去後 (キシ

ン)

上記マゼンタ着色粒子

流動性付与剤 (キャボット社製: TS-720)

をミキサーで混合し、マゼンタナーとした。

(イエロートナー)

水

C. I. Pigment yellow 180

をフラッシュャーでよく攪拌した。ここにポリオール樹脂

(Mn 3700, Mw/Mn 4. 2, Tg 62度) 12

00部を加え、150度で30分湿練後キシレン100

0部を加え、更に1時間、水とキシレンを除去後 (キシ

ン)

上記マゼンタ着色粒子

流動性付与剤 (キャボット社製: TS-720)

をミキサーで混合し、マゼンタナーとした。

(イエロートナー)

水

C. I. Pigment yellow 180

とキシレンを除去後 (キシレンは100ppm以下にし

た)、圧延冷却しバルベライザーで粉砕、更に3本ロー

タ、圧延冷却しバルベライザーで粉砕、更に3本ロー

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タ、圧延冷却しバルベライザーで粉砕、更に3本ロー

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タ、圧延冷却しバルベライザーで粉砕、更に3本ロー

23	(Mn 3700、Mw/Mn 4.2、T g 62度)	
	上記マスターバッチ (MY-2)	12部
	帯電抑制剤 (オリエント化学社製 E-84)	4部
	を前記実施例 1 と同様な方法で重量平均粒径 6.9 $\mu$ * だ。	
	m、4 $\mu$ m 以下が 6.5 個数% のイエロー着色粒子を得 *	100部
	上記イエロー着色粒子	0.6部
	流動性付与剤 (キャボット社製: TS-720)	
	をミキサーで混合し、イエロートナーとした。 ※ 【0052】	
	(シアントナー)	
	水	600部
	C. I. Pigment blue 55:3	1200部
	をフラスコでよく攪拌した。ここにポリオール樹脂 ★ レンは 100 p.p.m 以下にした)、圧延冷却し、バレルペー	
	(Mn 3700、Mw/Mn 4.2、T g 62度) 12	
	0部を加え、150度で30分混練後キシン 100	
	0部を加え、更に1時間、水とキシレンを除去後 (キシン★	
	ポリオール樹脂	100部
	(Mn 3700、Mw/Mn 4.2、T g 62度)	
	上記マスターバッチ (MC-2)	9部
	帯電抑制剤 (オリエント化学社製 E-84)	4部
	を前記実施例 1 と同様な方法で重量平均粒径 6.9 $\mu$ * だ。	
	m、4 $\mu$ m 以下が 8.5 個数% のシアン着色粒子を得 ☆	100部
	上記シアン着色粒子	

をミキサーで混合し、シアントナーとした。

【0053】得られた二成分現像剤をデジタルフルカラープリンター（リコー社製「Piso COLOR5000」）改造機にセットし、ブラック、マゼンタ、イエロー、シアンの現像液で単色、2色重ね、4色重ねのフルカラー画像を形成した。この際2次転写圧は $30\text{ g/cm}^2$ であった。また現像剤上の帯電量、及びトナー付着量を吸引法により測定したところ、ブラック、マゼンタ、イエロー、シアンの順に $-24.0\text{ }\mu\text{C/g}$ 、 $-23.3\text{ }\mu\text{C/g}$ 、 $-23.3\text{ }\mu\text{C/g}$ 、 $-20.9\text{ }\mu\text{C/g}$ と現像剤に帯電量の絶対値は下がっていた。現像ローラ上の薄層量は均一で良好であった。また得られたプリント画像は単色～4色重ねまで全て説明であり、30倍ルーペで画像エッジ部を観察したがチリはなくシャープな画像であった。また転写抜け及び転写ボンツキについても30倍ルーペでも確認できず、かつ画像のムラも地肌かぶりも見られなかった。

【0054】実施例5

＜ブラックトナー＞実施例3と同様のブラックトナーを

【0054】実施例4  
実施例3と同様のトナーを使用し、各色とも平均粒径5  
0 $\mu$ mのフエリアイト粒子にシリコーン樹脂を表面コート  
としたキャリア100部に対し、5部の割合でターブラ  
ーミキサーにて混合し、現像剤とした。得られた二成分  
上記イエロー着色粒子 100部  
流動性付与剤（キャボット社製：TS-720） 1.0部  
をミキサーで混合しイエロートナーとした。  
シアントナー>実施例3と同様のシアントナーを使用 50【0056】得られた一成分現像剤をデジタルフルカラ

<p>ープリンター（リコー社製Ipsio COLOR5000）改造機にセットし、ブラック、マゼンタ、イエロー、シアンの現像順で単色、2色重ね、ブラックの入れない3色重ね、4色重ねのフルカラー画像を形成した。この際2次転写圧は30g/cm<sup>2</sup>であった。また現像ローラー上の帯電量、及びトナー付着量を吸引法により測定したところ、ブラック、マゼンタ、イエロー、シアン、ブラックの現像順に伴い帯電量の絶対値は下がっていた。現像ロー*10</p>	<p>上配イエロー着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配マゼンタ着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配ブラック着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配シアン着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配イエロー着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配マゼンタ着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配ブラック着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配シアン着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配イエロー着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配マゼンタ着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配ブラック着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配シアン着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配イエロー着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配マゼンタ着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配ブラック着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>	<p>上配シアン着色粒子 流動性付与剤（日本アエロジル社製：RY-50）※を使用した。</p>
--	--	--	--	---	--	--	--	---	--	--	--	---	--	--	--	---

【0066】実施例11 \* を使用した。

(イエロートナー) 実施例1と同様のイエロー着色粒子\*

上記イエロー着色粒子

流動性付与剤 (ワッカー社製: H2000)

をミキサーで混合しイエロートナーを得た。

(マゼンタトナー) 実施例1と同様のマゼンタ着色粒子※

上記マゼンタ着色粒子

流動性付与剤 (ワッカー社製: H2000)

をミキサーで混合しマゼンタトナーを得た。

(シアントナー) 実施例1と同様のシアントナーを得た。

上記シアントナー

流動性付与剤 (ワッカー社製: H2000)

をミキサーで混合しシアントナーを得た。

(ブラックトナー) 実施例1と同様のブラック着色粒子☆

上記ブラック着色粒子

流動性付与剤 (ワッカー社製: H2000)

をミキサーで混合しブラックトナーを得た。

◆社製 [psio COLOR5000] 改造機にセット

【0067】得られた一成分現像剤をデジタルフルカラー

プリンター (リコー社製 [psio COLOR50

00] 改造機にセットし、イエロー、マゼンタ、シア

ン、ブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

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たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

マゼンタとイエローの2色重ねとなるレッド、及び3色

重ね、4色重ねにおいてはチリが確認できた。また転写

抜けについては30倍ルーペでも確認できず、かつ画像

のムラも肉眼から見られなかった。

【0061】実施例8 \*

上記マゼンタ着色粒子

流動性付与剤 (日本アエロゾル社製: R972)

をミキサーで混合しマゼンタトナーを得た。

※ (ブラックトナー) 実施例1と同様のブラック着色粒子

(シアントナー) 実施例1と同様のシアントナーを使用

した。

※10

上記ブラック着色粒子

流動性付与剤 (日本アエロゾル社製: R972)

をミキサーで混合しブラックトナーを得た。

★一成分現像剤をデジタルフルカラー

プリンター (リコー社製 [psio COLOR50

00] 改造機にセットし、イエロー、マゼンタ、シア

ン、ブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

た。この際2次転写圧は30g/cmであった。また得られ

たブラックの現像順で単色、2色重ね、ブラックの入

らない3色重ね、4色重ねのフルカラー画像を形成し

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らない3色重ね、4色重ねのフルカラー画像を形成し







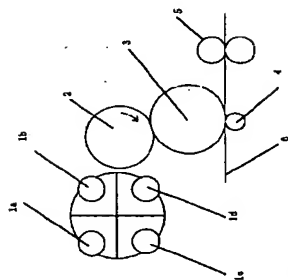
39	実施例11	実施例12	実施例13	比較例1	比較例2
現像方式	1成分	1成分	1成分	1成分	2成分
露光 (g/cm)	30	30	30	30	30
感光体	ドラム	ドラム	ドラム	ドラム	ドラム
中間転写体	ドラム	ドラム	ドラム	ドラム	ドラム
ステアリング線並布機構	あり	なし	あり	なし	あり
結露抑制	あり	あり	あり	あり	あり
第1現像	Y	Y	Y	Y	Y
シカ	H2000	TS720	TS720	TS720	H2000
量 (wt%)	1.0	1.0	1.0	1.0	1.0
O/M ( $\mu\text{C/g}$ )	-28.0	-22.0	-30.0	-22.0	-24.0
第2現像	M	M	M	M	M
シカ	H2000	TS720	TS720	TS720	H2000
量 (wt%)	1.2	0.8	1.2	0.8	1.0
O/M ( $\mu\text{C/g}$ )	-26.3	-21.3	-27.3	-21.3	-24.2
第3現像	C	C	C	C	C
シカ	H2000	TS720	TS720	TS720	H2000
量 (wt%)	1.0	0.6	1.0	0.6	1.0
O/M ( $\mu\text{C/g}$ )	-23.8	-20.1	-24.3	-20.1	-23.8
第4現像	Bk	Bk	Bk	Bk	Bk
シカ	H2000	TS720	TS720	TS720	H2000
量 (wt%)	0.8	0.4	0.8	1.2	1
O/M ( $\mu\text{C/g}$ )	-23.0	-19.7	-23.2	-23.5	-23.9
転写チリ	目視 良好	良好	良好	良好	良好
転写抜け	目視 良好	良好	良好	良好	良好
地肌かぶり	目視 良好	良好	良好	良好	良好

[改4]

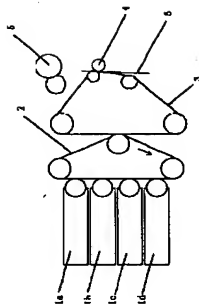
41	実施例3	比較例4	比較例5	比較例6
現像方式	1成分	1成分	1成分	2成分
露光 (g/cm)	30	30	30	30
感光体	ドラム	ドラム	ドラム	ドラム
中間転写体	ドラム	ドラム	ドラム	ドラム
ステアリング線並布機構	あり	あり	あり	あり
結露抑制	あり	あり	あり	あり
第1現像	Y	Y	Y	Y
シカ	H2000	TS720	RY50	TS720
量 (wt%)	1.0	1.0	1.0	1.4
O/M ( $\mu\text{C/g}$ )	-28.0	-22.0	-14.5	-42.0
第2現像	M	M	M	M
シカ	H2000	TS720	RY50	TS720
量 (wt%)	0.8	0.8	0.8	1.2
O/M ( $\mu\text{C/g}$ )	-25.3	-18.0	-14.0	-40.7
第3現像	C	C	C	C
シカ	TS720	TS720	RY50	TS720
量 (wt%)	0.8	0.8	0.8	1.0
O/M ( $\mu\text{C/g}$ )	-23.1	-20.2	-13.2	-37.8
第4現像	Bk	Bk	Bk	Bk
シカ	TS720	TS720	RY50	TS720
量 (wt%)	0.6	0.4	0.4	0.8
O/M ( $\mu\text{C/g}$ )	-22.4	-18.5	-11.8	-35.4
転写チリ	目視 良好	Blueで ひどい	Blueで ひどい	Blueで ひどい
転写抜け	目視 良好	Blueで ひどい	Blueで ひどい	Blueで ひどい
地肌かぶり	目視 良好	Blueで ひどい	Blueで ひどい	Blueで ひどい

- 【0086】
- 【発明の効果】以上、詳細かつ具体的な説明から明らかに、本発明によれば、中間転写方式かつ接触（2成分）転写方式を使用するフルカラー画像の形成において、転写方式を使用するフルカラー画像の形成において、イエロー、シア、マゼンタ、ブラックである4色のトナーにおいてトナー帯電量を調整し、更に流動性付与剤の添加量、及びトナー帯電量を現像順に最適化することにより、転写チリ、転写抜け、転写ポンジキおよび地肌かぶりのない再現性の高い画像を形成する画像形成方法、画像形成装置及びそれに用いる静電荷現像用トナーを提供することができる。
- 【図面の簡単な説明】
- 【図1】本発明のフルカラー画像形成装置の例の模式図である。
- 【図2】本発明のフルカラー画像形成装置の別の例の模式図である。
- 【符号の説明】
- (図1)
- 1a～1d：現像器  
2：感光体ドラム  
3：中間転写ドラム  
4：転写ローラ  
5：定着ローラ  
6：転写部材
- (図2)
- 1a～1d：現像器  
2：感光体ドラム  
3：中間転写ドラム  
4：転写ローラ  
5：定着ローラ  
6：転写部材

【図1】



【図2】



## フロントページの続き

- |         |                     |          |                                |
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|         |                     |          | GA50 GB12 GB15 GB22 GB25       |
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|         |                     |          | JC02 JC04 JC12 LA18 LA24       |
|         |                     |          | PA12 PA14                      |